CURRENT CONDITIONS

SOIL

Data Sources

- Field notes (Lott, 2001)
- Watershed Management on Range and Forest Lands (Meeuwig et al., 1975)
- Stable states and thresholds of range condition on North American rangelands: A viewpoint (Laycock, 1991)
- Range condition assessment and the concept of thresholds: A viewpoint (Friedel, 1991)
- Sediment reduction through watershed rehabilitation (Noble, 1963)
- Caribou National Forest Range Environmental Analysis Data (REA, 1970-1982)
- Caribou National Forest and Surrounding Area Sub-Regional Assessment for Properly Functioning Condition (USDA, 1997)
- Effects of trampling disturbance on watershed condition, runoff, and erosion (Packer, 1953)
- Preliminary Landslide Study Eastern Caribou Forest (Olson, et al., 1970)
- Changes in Soil Physical Properities under Grazed Pastures (Willatt et al., 1984)
- Special soil survey-Bonneville County (IWRB, 1968)
- Targhee National Forest Subsections and Landtype Associations (USDA-FS, 1998)
- Targhee National Forest Ecological Unit Inventory, Vol. 1 and 2 (USDA-FS, 1997)

Data Gaps

- Site-specific analyses were not conducted for this report. Only existing data was used to make assumptions about conditions, trends and inferences. Site-specific riparian inventories should be conducted to verify all inferences in this report. An inventory of acres of disturbances within the watershed would also be useful.
- Long-term erosion studies and ground cover studies
- Updated landslide inventory map

Erosion Processes

The amount of erosion occurring on the uplands in the watershed is directly related to the amount of protective ground cover found on a specific area. Ground cover on most undisturbed upland sites appears to be adequate to protect the soil from erosion. Areas of concern related to erosion caused by grazing use were identified on upland slopes that drain into the East Fork of Fall Creek. These areas of concern include sheep bed-grounds and driveways. These areas are approximately 10 to 30 acres in size and require some restoration work. Approximately 500 acres of upland range in deteriorated conditions were identified during preliminary field visits. Gullies and rills were also noted on some of these areas (Lott, 2001). Past restoration efforts have improved rangeland and soil conditions on areas where protective measures such as fencing and reseeding have been used. Examples of soil and rangeland improvements were identified on the sheep driveways where many of these areas had been reseeded and others had been fenced. About 5,760 acres of the Garden/Pritchard Sheep Allotment were closed to grazing due to suitability. Two watershed exclosures (about 680 acres) are in place; one on Commissary Ridge and one on Fourth of July Ridge. Approximately 6,440 acres of the watershed have been protected from grazing pressure.

Some geologic parent materials have more potential to erode than others. The Wayan Formation, Twin Creeks Formation, and Preuss Formation all tend to have high natural erosion potential. Figure 3 is an example of erosion occurring on some of these geologic formations.

Figure 34: Gully erosion occurring on the Wayan Formation.

Currently, recreation use in the watershed has more adverse impact on the soil resource than any other use. The proliferation of pioneered trails created by off-highway vehicles (OHV) is causing soils to erode at an accelerated rate on the uplands. Camping and recreation use along the riparian areas have compacted riparian soils and impacted stream banks in some areas. Measures to close some of the motorcycle trails up steep canyon slopes in Fall Creek have reduced the rate of erosion but some erosion continues to occur. These eroded areas have lost soil productivity potential and created increased sediment loading into Fall Creek and it's tributaries. Soil compaction and erosion from recreational use has been well documented (Meewig et al., 1975). Approximately 200 acres have been adversely affected by recreation use in the watershed. Because of the extent and amount of disturbance related to recreation use, a complete inventory of restoration needs should be documented and a plan developed for scheduled restoration work.

Mining for travertine has affected approximately 15 to 20 acres in the lower reaches of the watershed. Prospecting for phosphate has also occurred affecting approximately another 20 acres. These areas have not been reclaimed and remain in disturbed conditions.

Ground Cover

Literature related to rangeland condition thresholds and stable states of rangeland condition suggests that plant communities and conditions remain relatively unchanged for long periods (Laycock, 1991; Friedel, 1991). If these hypotheses are true, ground cover conditions are probably much the same today as they were when this information was collected in the 70's and 80's except on sites that have been treated or disturbed by fire, mechanically treated or have had herbicide applications. Noble (1963) studied the effects of ground cover on surface runoff and erosion. His results indicate that in the Intermountain West, a minimum of 60-70 percent ground cover is needed to effectively control surface runoff of water and erosion occasioned by torrential summer rainstorms. Percent ground cover that is less than this amount causes soil loss to increase at an extremely rapid rate. Reduction of cover and standing crop also exposes the soil more directly to the erosive force of wind (Thurow, 1991). A big sagebrush site with excellent ground cover located in the lower Fall Creek Basin is shown in Figure 4 along with a site with reduce ground cover in Figure 5.

Figure 35: Ground cover in the Fall Creek Basin averaging 90 to 95 percent cover on a mountain big sagebrush/Idaho fescue site.

Figure 36: Sheep bed ground on Commissary Ridge where ground cover has been reduced to less than 40 percent on a mountain big sagebrush/Idaho fescue site.

Range Environmental Analysis (REA, 1970-1982) data collected during the 1970's and 1980's documented ground cover on the site analysis worksheets and estimated ground cover on the ocular analysis worksheets. These data were analyzed for each major cover type/habitat type group within the watershed. Site conditions for these habitat type groupings were analyzed by averaging all observations and measurements in these groupings. The results of this analysis follows:

Table 11: Group 1. *ARTRV/FEID, ARTRV/AGSP, ARNO/AGSP*

Bare Soil %	**22.7**
Vegetation/Litter/Rock %	**77.3**
Observation Number	**48**

Table 12: Group 2. *ARTRV/SYOR/FEID, ARTRV/SYOR/AGSP, ARTRV/SYOR/POPR*

Bare Soil %	**18.4**
Vegetation/Litter/Rock %	**81.6**
Observation Number	**47**

Table 13: Group 3. *POTR/SYOR/Tall Forb, POTR/AMAL-SYOR/CARU, POTR/SYOR/CAGE,POTR/PAMY/CARU, POTR-PSME/SYOR/CARU*

Bare Soil %	**8.3**
Vegetation/Litter/Rock %	**91.7**
Observation Number	**38**

Table 14: Group 4. *PSME/CARU, PSME/SYOR/CARU, PSME/PAMY/BRCA, PSME/PHMA/CARU, PSME/PAMY/CARU*

Bare Soil %	**11.6**
Vegetation/Litter/Rock %	**88.4**
Observation Number	**24**

Table 15: Group 5. Treated Sites

Bare Soil %	**27.5**
Vegetation/Litter/Rock %	**72.5**
Observation Number	**7**

Regional and landscape scale indicators for properly functioning condition on these habitat type groupings provide ground cover requirements (USDA, 1996). On big sagebrush/grassland ecological types, there should be less than 20 percent bare ground or 80 percent ground cover. Tall forb types should have a minimum of 90 percent ground cover leading into the winter season. A balanced range of age classes is required for aspen, Douglas-fir and lodgepole pine types. No ground cover requirements are mentioned for these forested ecological types because they are generally above 90 percent in undisturbed conditions. The REA data collected on the watershed as shown in Tables B through F above indicates that most of the forested and rangeland sites are within or near properly functioning condition when comparing ground cover criteria (USDA, 1997).

Mass Stability

A large portion of the watershed has unstable landforms that are subject to mass instability and landslides. In 1969, Olsen et al., documented landslides on the Caribou

National Forest in the "Preliminary Landslide Study Eastern Caribou Forest". Formations that were identified as being unstable were the Wayan Formation, Twin Creeks Formation, Preuss Formation, and Wells Formation (Olsen et al., 1969). Ecological units that have been identified as being unstable are EU 1219, EU 1507, and EU 1970. Figure 6 shows the ecological units having high mass movement potential and high erosion potential.

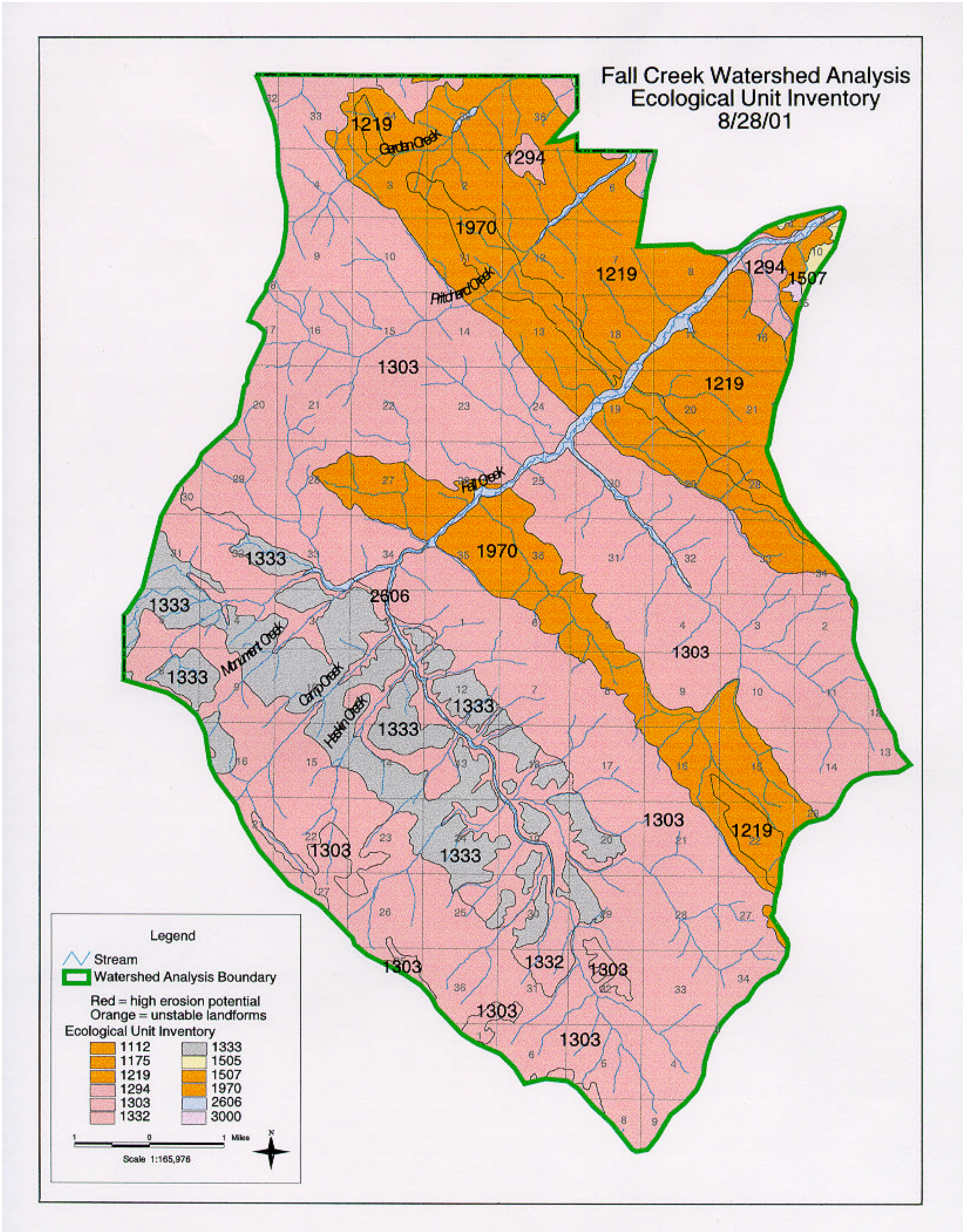


Figure 37: Fall Creek Watershed Analysis Ecological Unit Inventory Map

Riparian Soils

Riparian and wetland areas include areas where free and unbound water is present at least seasonally in the upper soil profile. According to the 1997 Properly Functioning Condition Assessment of the Caribou National Forest that includes the Fall Creek watershed, hydrologic function in nearly all sub-basins has been altered or disturbed. Trampling of riparian soils by livestock was observed is some locations within the watershed. Some areas where stream banks had been trampled by livestock were also documented. Figure 7 shows an area in Camp Creek that has been trampled by livestock.

Figure 38: Riparian area in Camp Creek that shows livestock trampling that has resulted in pedestals.

Studies indicate that animal treading increases bulk density and decreases air permeability and hydraulic conductivity that affects soil productivity (Willatt and Pullar, 1984). It has been noted that on healthy range, the top layer of soil is usually the most permeable, the most fertile, and often the most resistant to detachment (Meewig et al., 1975). Excessive trampling by grazing animals causes an increase in runoff and erosion (Packer, 1953).

Some areas have recently been farmed near the mouth of Fall Creek. Most of these permitted areas on the Forest have been cancelled and the disturbed areas have been seeded. Below the Forest boundary, farming practices remain in place.

WATER

WATERSHED CONDITIONS

In its simplest form, a watershed's condition can be viewed as the status of its components as a result of natural and anthropogenic disturbances. To get a clear understanding of a watershed's condition, both the spatial and temporal variability must be considered. Five sub-watersheds were identified to address the spatial variability: Lower Fall, Upper Fall, South Fall, Prichard, and Garden. The temporal variability was addressed by evaluating both historic and current conditions. This section deals with current conditions.

Inland West Watershed Initiative Ratings (IWWI)

The IWWI was developed to evaluate all federally managed subwatersheds in the Great Basin and Rocky Mountain areas using common criteria. This analysis focused on three IWWI factors: watershed vulnerability, geomorphic integrity, and water quality integrity. These terms were defined under historic conditions.

Table 16: Current Conditions:

	Prichard	Garden	Lower Fall	Upper Fall	SF Fall
Watershed Vulnerability	High >50% Sensitive	High >50% Sensitive	High >50% Sensitive	High >50% Sensitive	High >50% Sensitive
Geomorphic Integrity	High All streams fully Functioning	High All streams fully Functioning	Moderate <20% Not fully Functioning	Moderate <20% Not fully Functioning	Moderate <20% Not fully Functioning
Water Quality	Moderate <20% Impaired	High No impairment	Low >20% Impaired	Moderate <20% Impaired	Moderate <20% Impaired
Composite	Moderate	Moderate	Low	Moderate	Moderate

Watershed Conditions Resulting from Disturbance

Data Sources/Gaps

- Field reconnaissance by Philbin (2001).
- "Recollections of Fall Creek" by Brunson (2001).
- The condition of unofficial roads and trails is a data gap.

Assumptions

- Natural disturbances were adequately addressed in the section on Drainage Basin Description and in the IWWI rating for watershed vulnerability.
- Land use is the dominant factor influencing watershed conditions.

Current Conditions

Anthropogenic activities affect the disturbance regime by changing the frequency, timing, and magnitude of sediment and water movement through the watershed. In this analysis area roads and trails, dispersed recreation, grazing and fire are the dominant mechanisms of change. The magnitudes of these mechanisms are summarized in the table below.

Roads and Trails: While the density of roads and official trails is relatively low (1.5 miles/square miles), they are having a moderate impact on overall watershed condition. This is primarily the result of two roads: FS Road 077 (the main road) and FS Road 376 (the June Creek road). These roads are discussed below.

In the "Lower Fall" subwatershed the main road cut off historic meanders, encroaches on Fall Creek, delivers sediment during storm events and road maintenance, and provides access to several dispersed recreation sites. These dispersed sites are located along the creek wherever wetlands are not present. It's at these sites that most of the bank erosion in this subwatershed is found. Also related to the main road are several fords that are causing local problems. The most problematic of these are found near Echo Canyon, Horse Creek, and South Fall. The ford at South Fall is "improved," but the structure is not level with the streambed and is resulting in a low flow fish barrier. Finally, unofficial trails are affecting storm runoff and sediment delivery, as they are steep paths with no drainage or erosion control to mitigate effects.

In the other subwatersheds, roads and trails are only having isolated effects primarily at stream crossings. There are three impactive fords in the "South Fall" subwatershed that are delivering sediment and affecting channel function. In fact, the worst ford in the entire watershed is located just above the confluence with Fall Creek. In the "Upper Fall" subwatershed, the June Creek road delivers sediment to several streams and draws at several unimproved fords.

Grazing: While the level of grazing related impacts is high at the watershed scale, most of these impacts are associated with the "Upper Fall" subwatershed. The combination of naturally sensitive banks, vegetative alterations, and direct trample has produced substantial bank damage. This is responsible for most of the water quality problems found downstream. Additional impacts have resulted from low streamside ground cover. As the amount of bare soil increases, so does sediment. This occurs as dust settles in the stream and as precipitation washes soil into the channels. This is most prevalent in the "Upper Fall" area. While grazing doesn't appear to be causing significant reach scale problems in the "Lower Fall" or the "South Fall" subwatersheds, there are some isolated problems in these areas. Grazing disturbances are limited to the upper and very lower portion of the "Garden" and "Prichard" subwatersheds.

Fire: An escaped fire from Prichard Creek has resulted in approximately 50% bank instability in an affected reach of Garden Creek (likely 25% overall). While the Current

Creek fire increased sediment production and bank instability in Fall Creek, these variables are no longer affected.

Table 17: Impacts of various disturbances on watershed conditions

Subwatershed	Natural	Roads and Trails	Dispersed Recreation	Grazing	Fire
Fall Creek	**High**	Mod-High	**Moderate**	**High**	**Low**
Lower Fall	Low	High	High	Moderate	Low
South Fall	High	Low	Low	Moderate	Low
Upper Fall	High	Moderate	Low	High	Low
Garden	Data Gap	Likely Low	Low	Likely Low	Mod-High
Prichard	Data Gap	Likely Low	Low	Likely Low	Data Gap

Low =	The activity is having very little effect on water quality or stream function.
Moderate =	While the activity is affecting water quality or stream function, the effects are either secondary or localized. Reducing impacts could improve stream conditions but they would remain degraded unless activities with high ratings are addressed.
High =	The activity is having a substantial effect on water quality or stream function. This is the main reason the stream is degraded.

RIPARIAN CONDITIONS

Properly functioning riparian areas are critical in maintaining healthy and diverse aquatic systems. They influence water quality and fish habitat by providing: (1) shade to regulate water temperatures, (2) strength to stream banks (3) large woody debris, (4) fine organic material and invertebrates as a food source, (5) sediment and water filtration, and (6) cover for fish.

Flood Plain and Wetland Conditions

Data Source/Gaps

- Data was obtained from the National Wetland Inventory (US Fish and Wildlife Service).
- Riverine wetlands may not be fully shown along tributary streams.

The wetlands at the mouths of Garden and Prichard Creeks on private land were converted to agricultural uses with only small remnants remaining. In Fall Creek most of the wetlands remain but have been impacted by the valley bottom road, recreation and grazing. The largest expanse of wetlands is found between the mineral springs and Current Creek. There is also a new wetland that was formed when the road cut off a meander in the lower Fall Creek subwatershed. The old channel is now an oxbow wetland.

Riparian Vegetation/Conditions

Data Sources/Gaps

- Stream Stability Surveys (2001).
- Personal Observations (Philbin, 2001).
- Riparian conditions along minor tributaries are a data gap.

Within the Fall Creek watershed there are three different scenarios drive riparian conditions. The first is that the stream is meandering into the adjacent hillslope resulting in bank erosion. In this case there is a fairly wide riparian strip on one bank and a narrow or non-existing strip on the other. This situation also exists where there is a terrace on one bank and a lower floodplain on the other. In both of these cases, the lower bank is covered by wetland/riparian vegetation while only a narrow strip exists on the higher terrace. Where this strip is disturbed, bank erosion can be severe. This is the most common situation in the “Upper Fall” and “South Fall” subwatersheds. While this scenario also exists in the “Lower Fall” area, it is not the dominant situation. In this subwatershed a dry terrace is found where many of the dispersed recreation sites are located. When the combination of camping and cattle reduce the level of bank vegetation, severe erosion is common. The second scenario occurs where the stream has downcut or has minimal access to its floodplain. In this case, the narrow riparian stringer is present on both banks. This provides little protection and the banks are very sensitive to disturbance. This situation is not common in the drainage. Finally, the third scenario occurs where the stream is fully connected to its floodplain and the riparian vegetation is wide on both banks. This is a stable situation that is the most common scenario in the “Lower Fall” subwatershed.

From the South Fork to June Creek riparian condition (with regard to maintaining stream banks) is fair. This means that there is 70-90% density but that few plant species or lower vigor suggest a less dense or deep root mass. The degraded conditions (from excellent) are tied to the abundance of thistle. It is very likely that thistle is the co-dominant species to the willow. Dispersed recreation along Fall Creek is also having a substantial impact on the riparian vegetation as many riparian areas are being used as camping sites. Conditions rate out the same for South Fall although the abundance of thistle and dispersed recreation are only really affecting the trailhead area. From June Creek upstream the rating is fair-poor. This means that there is 50-70% density and lower vigor and still fewer species forms a somewhat shallow and discontinuous root mass. Grazing is having a major impact in this area.

STREAM CONDITIONS

Now that the drainage basin, climate, watershed conditions, and riparian conditions have been evaluated we can move on to stream condition/function. In all stream systems there exist unique balances between many interrelated variables including: stream flow, sediment quantity and size, geomorphic controls, bank vegetation, and floodplain accessibility. A major shift in any of these variables may initiate a series of adjustments leading to a new channel form. This section begins with an assessment of the stream flow and sediment regimes and ends with a discussion of stream conditions. Stream types are from Rosgen (1994).

Stream Flow Regime

The stream flow regime refers to the quantity and timing of runoff. Both of these variables are critical factors in determining the health of aquatic systems. Climate, watershed condition, and riparian condition all influence the streams runoff patterns.

Data Sources/Data Gaps

- U.S. Geological Survey (USGS) stations used included: Fall Creek near Swan Valley, ID (13034000); and Snake River near Irwin, ID (13032500).
- A data gap is the limited data set for Fall Creek. This makes the confidence level of the following section low-moderate.

Assumptions (additional assumptions are found under the historical section)

- Two overlapping years (1935 and 1936) was adequate to compare historic stream flows. May 15th was the date used for the comparison.
- Since Fall Creek peaks in mid-May, May 15th is assumed to be an appropriate date to use for evaluating changes in Fall Creek's contribution to the South Fork.
- The average of the two annual peak flows for Fall Creek are assumed to be representative of normal conditions. This average was compared to the South Forks average May 15th flow (over 20-years) to determine post dam changes in relative contributions.

Current and historic conditions are likely very similar within the Fall Creek watershed. The main difference is in the contribution Fall Creek makes to the South Fork. The operation of Palisades Dam has delayed the South Forks annual peak by one month. Prior to the dam's completion, 71% of the South Forks peaks came in June and 7% came in July. Following construction these percentages changed to 50% and 30%. Using a 20-year period from 1975-94 the average flow for the South Fork on May 15th was 11,774 cfs. This means that Fall Creek now contributes 1.7% of the flow during the same time period analyzed for historic conditions. This is a 30% increase, which probably means there is a true difference even with the small sample size.

Within the Fall Creek watershed, the South Fork is the largest water producer. In fact, it appears that the South Fork produces almost as much water as the rest of the basin combined. It is also clear that beaver play an important role in maintaining late season flows. During two reviews (July 30 and August 10) the upper extent of perennial flow lowered from the June Creek confluence to .8 miles below the confluence. Without

Beaver ponds, this point would likely be down by South Fall Creek. Beaver dams were abundant to .2 miles below Rash Canyon.

Sediment Regime

The sediment regime refers to the size, quantity and timing of soil and rock movement through the watershed. All three of these variables are critical factors in determining the health of aquatic systems. Climate, drainage basin characteristics, watershed condition, and riparian condition all influence the streams sediment regime.

Data Sources

- Palisades Subbasin Assessment (DEQ, 2001).
- Stream Stability Surveys (Caribou-Targhee National Forest, 2001).
- Targhee National Forest Monitoring (1979).
- Watershed reconnaissance by Philbin (2001).

Sediment Sources

While upslope erosion displaces soil particles, this material must be delivered to a stream to effect water quality. This delivery generally occurs where disturbances are either close to or cross a stream. In most cases where disturbances are not close to streams, sediment is efficiently trapped on the hillslopes. However, this filtration is less likely to occur where motorized trails run straight up the slope or grazing reduces ground cover. The previous section on “Watershed Conditions Resulting from Disturbances” is closely tied to this section.

The primary sediment sources can be placed into three categories: (1) channel disturbances/ erosion; (2) mass wasting; and (3) surface erosion. Of these, channel erosion and mass wasting are the key sediment producers since they deliver large pulses of material in all size classes.

<u>Channel Disturbances/Erosion:</u> Both the Palisades Subbasin Assessment and the Forest’s Stream Stability Survey found low bank stability in this drainage (table 3-3 and 3-4). This indicates that channel erosion is a major source of sediment at the watershed scale. Channel erosion is important since it produces both suspended and bedload sized particles. The coarser sizes such as sands and fine gravels typically move as bedload, which can have negative effects on channel morphology. These sediments are also input directly to the stream system as opposed to sediment generated outside of the channel. The main causes for channel disturbances are dispersed and motorized recreation, high levels of riparian utilization, bank trampling, and riparian roads. Once disturbed, high flows can erode long sections of bank producing large sediment inputs. High banks and terraces can also fail as the soils dry and lose cohesion. In these cases, riparian soil moisture is low and the altered vegetation is less effective at maintaining bank stability. The presence of livestock on these banks has greatly increased the rate of failure. Channel erosion is most prevalent in upper Fall, South Fall, Camp, Monument, and Gibson creeks.

Mass Wasting: Mass wasting produces large pulses of both coarse and fine sediments. These episodic events can have a major effect on stream conditions. The main causes of mass wasting in this drainage are avalanches and slumps. Mass wasting is most prevalent in the “Upper Fall” (between June and Haskins creeks) and “South Fall” subwatersheds.

Surface Erosion: Roads, motorized recreation trails, dispersed camping, extreme grazing utilization, and cattle trails are the primary areas of surface erosion. These activities are even more harmful when located in riparian areas or when they cross streams. Surface erosion is primarily a concern in the “Lower Fall” (roads and recreation) and “Upper Fall” (grazing and roads) subwatersheds.

Turbidity: Turbidity is influenced by suspended silt, clay, finely divided organic matter, plankton, and microorganisms (MacDonald, et.al 1991). Turbidity was measured four times in Fall Creek in 2000. This included two spring and two fall measurements. The maximum reading was 3.3 NTU during early June dropping to 1.4 in late August. This would imply that turbidity is not an issue in Fall Creek. It is likely that the abundant aquatic vegetation filters sediment from the water column. Garden Creek also had low turbidity levels with readings ranging from 5.5 to 2.4 NTU. These two streams had among the lowest measured turbidities in the Subbasin. In addition to data obtained for the subbasin assessment, monitoring in 1979 looked at the various tributaries (table 3-2).

Table 18: Forest Turbidity Monitoring

Stream	Discharge	Turbidity
May 25, 1979		
Fall Creek	57	34
SF Fall Creek	23	26
Gibson Creek	7	26
April 29, 1979		
Fall Creek	20	18
Fall Creek @ South Fork[1]	25	22
SF Fall Creek	10	12
Gibson Creek	4	28

[1] This station was not monitored in May. It appears that the stream loses 5 cfs between the South Fork and the Fall Creek Station. This seams odd since Horse Creek, Current Hollow, and Little Current all enter Fall Creek in this reach.

From this data it appears that turbidity in Fall Creek and South Fall Creek is flow dependant. That is, there is enough available sediment to increase turbidity when flows rise. It also appears that Gibson Creek is not flow dependant. In this case even though flows increase there is not enough power to transport more sediment.

Sediment Transport

Sediment that reaches small creeks must then be transported into larger streams before it influences aquatic biota or other beneficial uses. Therefore, a discussion on sediment transport is required.

At the watershed scale most stream segments are either B or C channel types. As such, most sediment is stored in bed forms such as point, side, and mid channel bars. It's also clear that a lot of sediment is stored within the substrate. Given the size of the substrate, this bed material can be mobilized on a regular basis releasing this stored sediment in large pulses. These pulses can then degrade stream conditions when velocities decrease and the sediment is deposited. Due to the abundant sediment sources in the watershed, material moving out of a reach is quickly replaced with sediment from above. In the C reaches, the ability of the streams to deliver fine sediment to their floodplain can be important in building banks and accelerating recovery. This is evident in the lower reach.

- The South Fork is a "B" stream type that is somewhat capable of transporting sediment. Evidence for this is that despite high levels of sediment production, the streambed has limited bar development, a moderate-low shift in particle sizes, and a moderate to high level of sediment in the substrate. The combination of high sediment production (from bank erosion) and the ability to route this material downstream make the South Fork a source and transport reach. However, it is close to being a depositional reach and does have depositional "C" type inclusions.

- Upper Fall Creek is not able to transport the large quantities of sediment that it's producing. This is shown by accelerated bar development, a marked shift in particle sizes, and high levels of sediment in the substrate. This reach is the primary sediment source to lower Fall Creek and given the abundant material in storage, it will be for a long time. These conditions make the upper portion of Fall Creek both a source and a depositional reach.

- The ability of Fall Creek (below June Creek) to transport sediment is limited by abundant aquatic vegetation in the segment below the mineral springs. This area will continue collecting sediment until an extreme event flushes the material to the South Fork Snake River. Above Little Current Hollow, Fall Creek cannot transport the large quantities of sediment it is receiving from above. This is shown by moderate increase in bar development, a marked shift in particle sizes, and high levels of sediment in the substrate. This is a depositional reach.

Stream Channel Morphology/Stability

Historically streams in this watershed would have been in a state of "dynamic equilibrium." This means that the channel would be in balance - not aggrading or degrading. Following the geomorphic theory that channels form to accommodate the watershed products (water, sediment, and woody debris) that they normally process, we would not expect a stable stream to show more than isolated channel erosion. Widespread erosion would imply that the current conditions are outside of the range that formed the existing channel. This section merges the stream flow and sediment regimes with the riparian vegetation, and geomorphic controls to evaluate the stream channel itself.

Data Sources:

- Palisades Subbasin Assessment (IDEQ, 2001) – Referred to as BURP data below.
- Stream Stability Surveys (Caribou-Targhee National Forest, 2001).
- Personal Observations (Philbin, 2001).
- Professional interpretation of maps and aerial photos.
- Cooperative Study on the Snake River (USDA, 1979)

Data Gap:

- Information on small tributary streams is a data gap.

Assumptions:

- Severe Bank Erosion is <50% Bank Stability
- High Bank Erosion is 50-80% Bank Stability
- Low Bank Erosion is >20% Bank Stability

BURP Data Review (data is found in table 3-3)

BURP data suggests that bank erosion is severe in four areas: upper Fall Creek (just above June Creek), Camp Creek, Monument Creek, and lower Fall Creek. The forest's stability survey and Philbin's observations support this finding for the reach above June Creek, but not for the lower Fall Creek reach. In lower Fall Creek, Philbin estimates bank stability to be greater than 80%. The findings for Camp and Monument creeks seem reasonable from Philbin's observations at the June Creek road crossing and their confluence with Fall Creek. The BURP data then suggests that bank erosion is high for the uppermost reach of Fall Creek and for lower Gibson Creek; and is low in upper Gibson and the South Fork. Again Philbin's observations differ from the BURP data as he found bank stability to be approximately 70% in the South Fork. With regard to sediment, Philbin's observations differ from the BURP data for the lower Fall Creek reach. Philbin estimates fine sediment levels to be between 60-75% while BURP reports 36%. See watershed map 1 for sample locations.

The two sources collected data in very different ways. The BURP data used point sampling while the forest's stability survey was a continuous stream walk. While the two sources reveal different fine scale results, certain course scale trends are obvious. When looking at the basin average, instead of individual sites (where the sample size is one), it's clear that sediment and bank instability are major problems. This is supported by the continuous stream walk. At the watershed scale, the average bank stability is 58% suggesting a high level of damage. Sediment levels are also very high. Watershed wide the average is 65% with all streams showing impacts related to high sediment levels.

Biological indicators, as well as Forest Service data, support the finding that sediment is affecting aquatic production.

Table 19: BURP Data

Stream	Rosgen Type	% Fines	W/D Ratio	Ave % Stability	Ave % Cover
Upper Fall Creek Subwatershed					
U Fall Cr	A	60	18.9	76	89
M Fall Cr (above June Cr)	C	53	09.7	15	72
U Gibson	A	73	3.2	81	98
L Gibson	A	91	2.2	77	94
Camp Cr	B	61	12.5	25	94
Monument	B	100	7.5	44	99
Lower Fall Creek Subwatershed					
L Fall Cr	C	36	10.9	36	73
South Fork Fall Creek Subwatershed					
U S.Fork	B	61	13.4	87	98
L S.Fork	C	47	11.2	82	95
Summaries					
Wshd Scale		65	-	58	90

Existing Conditions

Lower Fall Creek***:*** High sediment levels have changed the dominant stream type from C3 to C4/6. This has resulted in a poor stream bottom rating from Little Current to June Creek. While bank erosion is occurring at dispersed recreation sites, Philbin estimates that bank stability exceeds 80% at the reach scale. In addition, trends appear to be improving as shown by new vegetation on stream banks and bars. While the current banks are vegetating and showing signs of improvement, there are old high banks. This may account for the discrepancy between BURP survey data and Philbin's observations. It is clear that erosion was once severe in this segment (this past severe erosion was noted in a 1979 USDA Cooperative Study on the Snake River).

Below Little Current Hollow, Fall Creek is a moderately stable C4 stream type in fair condition The vast wetland complex adjacent to this reach appears to be improving stream conditions by filtering sediment from flood flows and the adjacent slopes and by reducing riparian impacts. Approximately 50% of its streambed is affected by sediment that likely originated in upstream reaches. Above Little Current conditions deteriorate with sediment now affecting more than 80% of the streambed. The frequency of dispersed campsites also increases, as does the associated bank erosion. In these areas, the cumulative effects of recreation and cattle are causing severe localized erosion as bank vegetation is eliminated and cattle can concentrate and easily reach the stream. Conditions are similar from the South Fork Fall Creek to June Creek, although more cobbles are present in this reach. Signs of beaver are also more common above the South Fork.

South Fork**:** This is a moderately unstable B4 stream in fair condition. Most of its problems are associated with high energy and channel migration. An interesting thing about this stream is that it has a high sinuosity for a B stream type. As the stream migrates across its moderately narrow valley bottom, it erodes into the adjacent side slopes and terraces resulting in a very high level of bank erosion. This natural process is affecting both the upper and lower banks. The South Fork's substrate is less impacted than the other surveyed reaches, but sediment levels are still high with approximately 50% of the streambed being affected by deposition. However, the make-up of particle sizes has not been substantially altered and nor has the stream type been changed.

Upper Fall Creek: Above June Creek the condition of Fall Creek becomes much worse. The stream is an unstable C5 stream type in poor condition. Upper and lower bank erosion becomes severe causing nearly yearlong sediment inputs. These inputs make up an estimated 80% of the total sediment load for the Fall Creek drainage. Associated with this sediment is extensive deposition that has resulted in a substantial change in bed materials. More than 50% of the bed likely is affected by deposition and the bed has shifted from cobble/gravel to gravel/silt. These problems are the result of highly unstable natural conditions (similar to those described for the South Fork above) exacerbated by cattle grazing. In this system, bank vegetation is critical in maintaining stability. When grazed, these banks have no resistance to flows. The existing bank vegetation density is estimated at 50-70% with low vigor. This forms a shallow and discontinuous root mass that. Therefore the banks easily slough off when cattle are on them. The trends appear to be declining as banks are eroding faster than they are building and gravel bars are being trampled preventing their stabilization. While trends were likely improving following a reduction in heavy grazing pressure, floods in the 1980's washed out beaver dams and scoured out the channel. This set back recovery and made the banks extra sensitive. The site potential for this stream is similar to South Fall Creek.

Table 20: Summary of Forest Stability Surveys

Stream	**Stream Type**	**Rating**	**Score**	**Upper Banks**	**Lower Banks**	**Bottom**	**Trend**
Fall (SFork-L.Current)	C4	Fair	92	19 (G)	32 (F)	41 (F)	+
Fall (L.Current-SFall)	C4/6	Fair	106	20 (G)	32 (F)	*54 (P)*	+
Fall (SFall-June)	C4/6	Fair	101	19 (G)	29 (F)	*53 (P)*	+
South Fall	B4	Fair	100	27 (F)	29 (F)	44 (F)	0
Upper Fall	C4	*Poor*	*129*	*31 (P)*	*45 (P)*	*53 (P)*	-
Upper Fall	C3	*Poor*	*121*	*31 (P)*	*41 (P)*	*49 (P)*	-

	Excellent	Good	Fair	Poor	Comments
Upper Banks	≤15	16-20	21-30	31+	Bankfull-Slope Break
Lower Banks	≤19	20-26	27-39	40+	Bottom-bankfull
Bottom	≤22	23-30	31-45	46+	Bottom
Total	≤56	57-76	77-114	115+	

WATER QUALITY

Water Quality refers to the ability of a water body to support its beneficial uses. This can relate to changes in the physical channel or the water column. For this report changes to the physical channel were discussed under "STREAM CONDITIONS" while water column impacts are emphasized here.

Water Quality – Water Quality Limited Segments (303(d))

Data Sources

- The Palisades Subbasin Assessment and TMDL Allocations (DEQ, 2001)

In 1998 two project area streams were designated as water quality limited: Fall and Camp creeks.

Table 21: 303(d) streams in the analysis area.

	Segment	Pollutants	Miles
Fall Creek	Headwaters to South Fork	Unknown (likely sediment)	12.2 miles
Camp Creek	Headwaters to Fall Creek	Unknown (likely sediment)	4.6 miles

The existing beneficial uses for Fall Creek are salmonid spawning and cold-water biota. The state found that salmonid spawning was fully supported as they found multiple age classes of both cutthroat and brook trout. However, it found that upper Fall Creek did not support the beneficial use of cold-water biota. This determination was based upon a low macroinvertebrate score (MBI=1.89) at the upper end of the creek. The subbasin assessment notes that grazing and recreational uses are impacting riparian conditions and that sediment may be the cause of the impairment. While lower Fall Creek is not listed, the State found that its water quality and fish habitat are "highly impacted by land use." Therefore, IDEQ will place the entire length of Fall Creek on the State's 303(d) list. The State also determined that Camp Creek did not fully support cold-water biota. This was based upon a low macroinvertebrate score (MBI = 1.97) and very high levels of sediment. Salmonid spawning was not assessed for Camp Creek. The TMDL for both of these streams will be written in 2006.

The Subbasin Assessment noted that while South Fork Fall Creek is not listed, many off-road vehicle trails crisscross the creek contributing sediment to the creek. The assessment raised the potential of listing the South Fork if conditions degrade. However, a review by

Philbin found that off-road vehicles are not the main problem. While three stream crossings are delivering sediment to South Fall, most of the sediment is from natural causes.

Water Quality - Temperature

Data Sources

- Thermographs were used in Fall Creek in 1998 and 2001
- Spot temperatures were collected in Fall Creek and all perennial tributaries on July 30, 2001. The thermometer was tested in an ice bath prior to and following sampling. This test found the instrument to be right on.

In 2001 a thermograph placed just below Little Current Hollow found an instantaneous maximum temperature of 25.0^{C} (July 2), a maximum daily average of 19.7^{C} (July 4), and a seven-day running average of 23.4^{C}. These temperatures exceed State water temperature standards. In fact, 42% of the sampling period (July 1 – Aug 31) exceeded state standards.

In 1998 two thermographs were placed in Fall Creek: one just above June Creek and the other just below the South Fork. These deployments found maximum temperatures of 23 degrees at the upper site and 20 degrees at the lower site. The higher temperature at the upper site was likely the result of very low flows (the stream was barely flowing). These deployments likely missed several exceedences as the instruments were deployed in late July.

Fall Creek and its tributaries were also sampled in 2001 to locate "hot spots" in the stream system. Tables 3-5 and 3-6 present this data. Four conclusions may be drawn from this data:

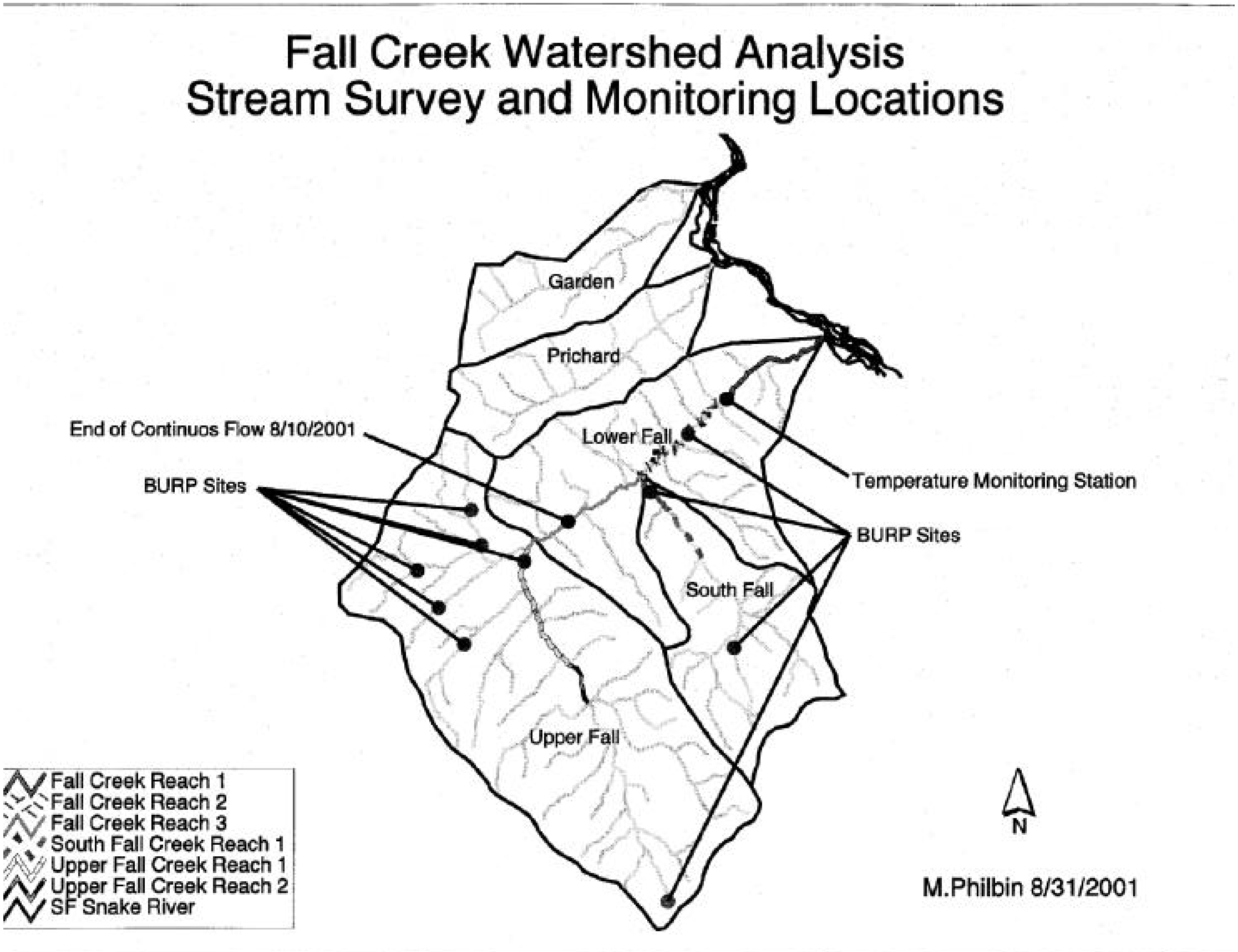
1. In the afternoon, Fall Creek warms up slowly in a down stream direction.
2. While the morning trend is similar, there is more variability.
3. Camp Creek appears to be the warmest tributary.
4. The mineral springs (between Echo Canyon and section 17) do not appear to be affecting water temperatures.

Table 22: Early Sampling Period (1030-1230). Fall Creek sites are listed from lowest to highest.

Stream	Water Temp.	Air Temp.	Time	Stream Type
Fall Creek				
Fall@ Property Line	18.0	24.0	1045	C6
Fall nr Echo Canyon	19.0	24.0	1055	C4
Fall in Sec 17	15.0	25.0	1100	C4
Fall below Horse Cr	16.0	25.0	1120	C4
Fall above SF Fall	14.5	25.0	1140	C3/4
Fall @ Rash Canyon	13.5	26.0	1200	C4
Fall @ Blacktail	14.5	27.0	1120	C4
Fall above June	14-18	27.0	1230	C4
Tributaries				
South Fork	13.0	25.0	1150	C4

Table 23: Late Sampling Period (1330-1530). Fall Creek sites are listed from lowest to highest.

Stream	**Water Temp.**	**Air Temp.**	**Time**	**Stream Type**
Fall Creek				
Fall@ Property Line	22.0	28.5	1520	C6
Fall nr Echo Canyon	21.5	28.5	1510	C4
Fall in Sec 17	20.0	27.0	1430	C4
Fall below Horse Cr	19.5	27.0	1420	C4
Fall above SF Fall	18.5	27.5	1445	C3/4
Tributaries				
South Fork	18.0	27.5	1455	C4
Gibson Creek	19.0	28.0	1350	B4
Camp Creek	22.0	26.0	1330	B4


Fall Creek Watershed Analysis
Stream Survey and Monitoring Locations
Garden
Prichard
End of Continuos Flow 8/10/2001
Lower Fall
BURP Sites
Temperature Monitoring Station
BURP Sites
South Fall
Upper Fall
Fall Creek Reach 1
Fall Creek Reach 2
Fall Creek Reach 3
South Fall Creek Reach 1
Upper Fall Creek Reach 1
Upper Fall Creek Reach 2
SF Snake River
N
M.Philbin 8/31/2001

FIRE

Fire, insects and diseases have been the primary agents for ecological disturbance within the analysis area for centuries. Fire has been a frequent visitor in the area either as localized spot fires or as large, expansive conflagrations. Smoke associated with these fires has also been a part of the environment. Smoke could linger throughout the summer, and well into the fall in dry years and severe drought periods. Palisades Ranger District records show numerous fire starts from the 1960 through the current period. Most area fires have been contained to small acreage with occasionally larger fire occurring during severe drought periods. Records indicate large fire occurrence in the Fall Creek, Pritchard and Garden Creek drainages have been limited and spaced out over the decades. Records indicate that large fire occurrence within the analysis area rarely exceeded more than 1000 acres. This was primarily due to suppression activities.

During the 1960's fire occurred within the Fall Creek Basin and Current Creek areas of the analysis area. Throughout the 1970's, numerous small natural fires occurred limited to small acreage less than ½ acre in size. The next large fire occurrence within the analysis area was located in June Creek in the 1980's. Throughout the 1990's to present time natural fire has been limited to small acreages due to suppression activities. Prescribed burning has been introduced into the analysis area in the Pritchard Creek and Garden Creek areas in the late 1990's - 2000 to restore vegetation to its natural ecological state. These prescribed fires have been limited to 1000 acres in size.

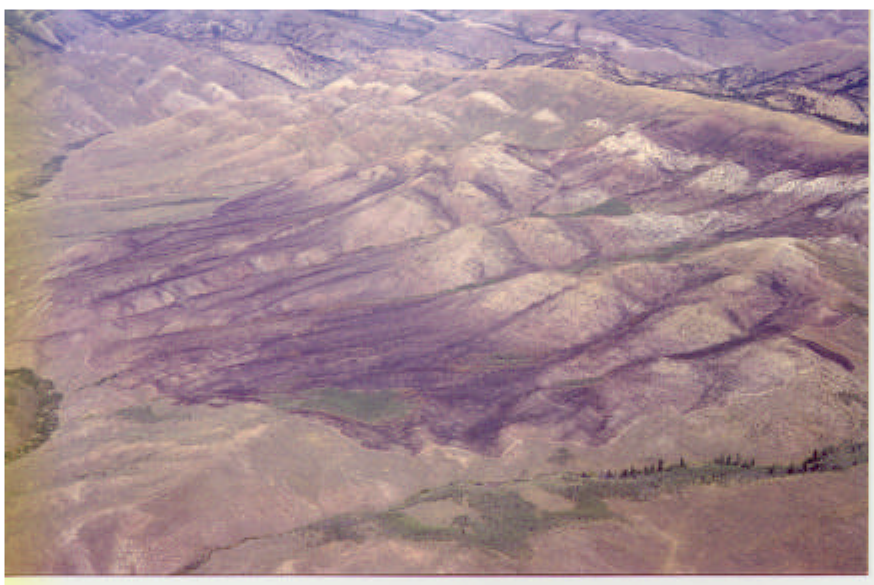


Figure 40: Fall Creek Basin Fire 1966_1000 Acres (Looking Westerly)

Figure 41: Current Creek Fire 1966 (Looking Down Canyon to the West)

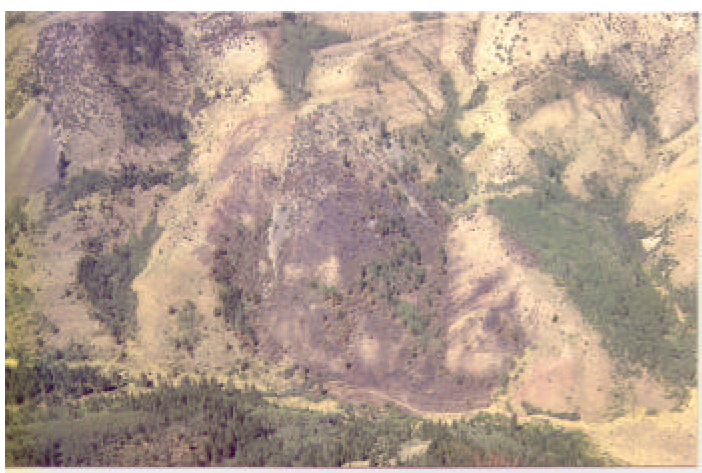


Figure 42: Garden Creek Fire 1966

Current habitat types within the analysis area have contributed to past and present conditions. Douglas-fir is a very fire adapted species. Mature Douglas-fir has thick, insulative bark, which protects the inner cambium layer from moderately severe surface fires. Although mature Douglas-fir are resistant to fire danger, saplings and seedlings are very susceptible due to resin blisters on the photosynthetic bark, low branching habit, close needles and thin bud scales present at the stages of development. Due to this susceptibility during the early development stages of Douglas-fir, the very dry Douglas-fir habitat, low frequency, low intensity fires have maintained closed stands. When large fires have occurred within these stands of Douglas-fir, fire has provided a mosaic of size classes and mixed species through less frequent, mixed severity fires.

Some lodgepole pine are fire dependent. Their serotinous cones release seed after wildfire has heated them enough to melt the resins that keep the scales shut.

The fire resistant species primarily occur in short-interval fire regimes; Douglas-fir. These fire regimes typically burned every 20-75 years, at low intensities. The species more prone to wetter sites, Alpine fir mixed conifer stands, typically burned at much lower frequencies but higher intensity. Most of these types of fires resulted in stand replacement or a pattern of mixed vegetation.

Past history has indicated most of the vegetation manipulation has occurred within the sagebrush, mountain brush communities in the analysis area. Natural fire, combined with prescribed burns within the analysis area has increased grass and forbs communities throughout the analysis area.

Current conditions within the analysis area indicate several types of fuel loading conditions exist from sample plot surveyed September 2001. Fuel loading condition range from low to high intensities. The spreadsheet below shows the fuel loading conditions throughout the analysis area.

Table 24: Fall Creek Fuel Loading Plot Samples

Plot	Latitude	Longitude	Picture Name	Tons/acre
1	43^{o}20^{l} 45.37^{ll} N	111^{o}26^{l} 6.82^{ll} W	plot1	2.421
2	43^{o}20^{l} 47.9^{ll} N	111^{o}26^{l} 8.70^{ll} W	plot2	2.421
3	43^{o}20^{l} 47.02^{ll} N	111^{o}26^{l} 11.64^{ll} W	plot3	2.421
4	43^{o}20^{l} 49.43^{ll} N	111^{o}26^{l} 11.40^{ll} W	plot4	2.421
5	43^{o}20^{l} 31.30^{ll} N	111^{o}26^{l} 8.88^{ll} W	plot5	10.094
6	43^{o}21^{l} 4.9^{ll} N	111^{o}26^{l} 22.67^{ll} W	plot6	10.094
7	43^{o}21^{l} 6.5^{ll} N	111^{o}26^{l} 23.90^{ll} W	plot7	10.094
8	43^{o}21^{l} 26.33^{ll} N	111^{o}26^{l} 44.1^{ll} W	plot8	25.345
9	43^{o}21^{l} 39.64^{ll} N	111^{o}27^{l} 1.00^{ll} W	plot9	25.345
10	43^{o}21^{l} 40.55^{ll} N	111^{o}27^{l} 2.40^{ll} W	plot10	5.379
11	43^{o}22^{l} 21.86^{ll} N	111^{o}27^{l} 3.20^{ll} W	plot11	5.379
12	43^{o}21^{l} 51.99^{ll} N	111^{o}27^{l} 12.15^{ll} W	plot12	11.725
13	43^{o}21^{l} 53.63^{ll} N	111^{o}27^{l} 14.67^{ll} W	plot13	11.725
14	43^{o}22^{l} 19.15^{ll} N	111^{o}27^{l} 44.78^{ll} W	plot14	38.292
15	43^{o}22^{l} 21.22^{ll} N	111^{o}27^{l} 47.35^{ll} W	plot15	38.292
16	43^{o}22^{l} 21.86^{ll} N	111^{o}27^{l} 47.82^{ll} W	plot16	38.292
17	43^{o}22^{l} 26.75^{ll} N	111^{o}28^{l} 16.25^{ll} W	plot17	38.292
18	43^{o}16^{l} 9.75^{ll} N	111^{o}24^{l} 16.72^{ll} W	plot18	23.679
19	43^{o}17^{l} 19.10^{ll} N	111^{o}25^{l} 10.64^{ll} W	plot19	23.679
20	43^{o}17^{l} 21.7^{ll} N	111^{o}25^{l} 13.56^{ll} W	plot20	23.679
21	43^{o}16^{l} 57.71^{ll} N	111^{o}24^{l} 45.84^{ll} W	plot21	5.951
22	43^{o}16^{l} 58.60^{ll} N	111^{o}24^{l} 46.78^{ll} W	plot22	5.951
23	43^{o}16^{l} 29.66^{ll} N	111^{o}24^{l} 43.61^{ll} W	plot23	3.539
24	43^{o}16^{l} 29.70^{ll} N	111^{o}24^{l} 42.14^{ll} W	plot24	3.539
25	43^{o}15^{l} 15.61^{ll} N	111^{o}25^{l} 47.81^{ll} W	plot25	5.394
26	43^{o}15^{l} 52.42^{ll} N	111^{o}25^{l} 48.60^{ll} W	plot26	5.394
27	43^{o}15^{l} 50.77^{ll} N	111^{o}26^{l} 54.95^{ll} W	plot27	29.092
28	43^{o}15^{l} 50.84^{ll} N	111^{o}26^{l} 54.01^{ll} W	plot28	29.092
29	43^{o}16^{l} 17.19^{ll} N	111^{o}27^{l} 38.95^{ll} W	plot29	13.441
30	43^{o}16^{l} 19.08^{ll} N	111^{o}27^{l} 37.95^{ll} W	plot30	13.441

Plot	Latitude	Longitude	Picture Name	Tons/acre
31	$43^{o}16^{l}47.24^{ll}$ N	$111^{o}28^{l}27.79^{ll}$ W	plot31	13.458
32	$43^{o}17^{l}14.57^{ll}$ N	$111^{o}28^{l}28.27^{ll}$ W	plot32	13.458
33	$43^{o}17^{l}14.57^{ll}$ N	$111^{o}27^{l}0.30^{ll}$ W	plot33	5.11
34	$43^{o}17^{l}14.35^{ll}$ N	$111^{o}27^{l}59.31^{ll}$ W	plot34	5.11
35	$43^{o}17^{l}46.96^{ll}$ N	$111^{o}27^{l}44.50^{ll}$ W	plot35	13.243
36	$43^{o}17^{l}46.96^{ll}$ N	$111^{o}27^{l}43.81^{ll}$ W	plot36	13.243
37	$43^{o}17^{l}56.26^{ll}$ N	$111^{o}28^{l}3.99^{ll}$ W	plot37	11.771
38	$43^{o}17^{l}55.89^{ll}$ N	$111^{o}28^{l}3.96^{ll}$ W	plot38	11.771
39	$43^{o}18^{l}27.05^{ll}$ N	$111^{o}28^{l}30.25^{ll}$ W	plot39	12.886
40	$43^{o}18^{l}28.22^{ll}$ N	$111^{o}28^{l}30.95^{ll}$ W	plot40	12.886
41	$43^{o}18^{l}56.59^{ll}$ N	$111^{o}28^{l}55.56^{ll}$ W	plot41	6.812
42	$43^{o}18^{l}55.70^{ll}$ N	$111^{o}28^{l}56.64^{ll}$ W	plot42	6.812
43	$43^{o}19^{l}23.35^{ll}$ N	$111^{o}29^{l}15.43^{ll}$ W	plot43	6.812
44	$43^{o}19^{l}24.25^{ll}$ N	$111^{o}29^{l}16.89^{ll}$ W	plot44	8.469
45	$43^{o}19^{l}46.70^{ll}$ N	$111^{o}29^{l}52.75^{ll}$ W	plot45	9.258
46	$43^{o}19^{l}45.85^{ll}$ N	$111^{o}29^{l}53.95^{ll}$ W	plot46	9.258
47	$43^{o}20^{l}15.45^{ll}$ N	$111^{o}30^{l}54.47^{ll}$ W	plot47	22.981
48	$43^{o}20^{l}14.69^{ll}$ N	$111^{o}30^{l}54.04^{ll}$ W	plot48	22.981
49	$43^{o}20^{l}8.03^{ll}$ N	$111^{o}31^{l}14.41^{ll}$ W	plot49	20.498
50	$43^{o}20^{l}9.26^{ll}$ N	$111^{o}31^{l}15.86^{ll}$ W	plot50	20.498
51	$43^{o}23^{l}9.25^{ll}$ N	$111^{o}31^{l}33.69^{ll}$ W	plot51	26.57
52	$43^{o}23^{l}9.09^{ll}$ N	$111^{o}31^{l}36.43^{ll}$ W	plot52	26.57
53	$43^{o}23^{l}4.17^{ll}$ N	$111^{o}31^{l}34.82^{ll}$ W	plot53	26.57
54	$43^{o}23^{l}6.95^{ll}$ N	$111^{o}31^{l}36.63^{ll}$ W	plot54	26.57
55	$43^{o}23^{l}15.38^{ll}$ N	$111^{o}\ 31^{l}9.97^{ll}$ W	plot55	10.75
56	$43^{o}23^{l}18.09^{ll}$ N	$111^{o}\ 31^{l}10.01^{ll}$ W	plot56	10.75
57	$43^{o}23^{l}17.29^{ll}$ N	$111^{o}31^{l}9.36^{ll}$ W	plot57	10.75
58	$43^{o}23^{l}15.26^{ll}$ N	$111^{o}31^{l}13.29^{ll}$ W	plot58	10.75
59	$43^{o}23^{l}9.89^{ll}$ N	$111^{o}31^{l}14.06^{ll}$ W	plot59	10.75

Plot	Latitude	Longitude	Picture Name	Tons/acre
60	$43^{o}22^{l}42.87^{ll}$ N	$111^{o}32^{l}33.77^{ll}$ W	plot60	10.07
61	$43^{o}22^{l}37.49^{ll}$ N	$111^{o}32^{l}19.49^{ll}$ W	plot61	10.07
62	$43^{o}22^{l}36.60^{ll}$ N	$111^{o}32^{l}11.32^{ll}$ W	plot62	10.07
63	$43^{o}23^{l}4.84^{ll}$ N	$111^{o}29^{l}58.64^{ll}$ W	plot63	5.19
64	$43^{o}23^{l}4.98^{ll}$ N	$111^{o}29^{l}56.14^{ll}$ W	plot64	5.19
65	$43^{o}23^{l}42.49^{ll}$ N	$111^{o}29^{l}34.23^{ll}$ W	plot65	6.48
66	$43^{o}23^{l}43.05^{ll}$ N	$111^{o}29^{l}32.33^{ll}$ W	plot66	6.48
67	$43^{o}23^{l}58.70^{ll}$ N	$111^{o}29^{l}45.51^{ll}$ W	plot67	16.28
68	$43^{o}23^{l}58.76^{ll}$ N	$111^{o}29^{l}45.51^{ll}$ W	plot68	16.28
69	$43^{o}24^{l}10.01^{ll}$ N	$111^{o}30^{l}3.45^{ll}$ W	plot69	3.18
70	$43^{o}24^{l}9.62^{ll}$ N	$111^{o}30^{l}4.63^{ll}$ W	plot70	3.18
71	$43^{o}24^{l}3.95^{ll}$ N	$111^{o}30^{l}28.76^{ll}$ W	plot71	3.49
72	$43^{o}24^{l}3.11^{ll}$ N	$111^{o}30^{l}28.89^{ll}$ W	plot72	3.49
73	$43^{o}24^{l}12.29^{ll}$ N	$111^{o}31^{l}14.08^{ll}$ W	plot73	27.22
74	$43^{o}24^{l}12.62^{ll}$ N	$111^{o}31^{l}9.81^{ll}$ W	plot74	27.22
75	$43^{o}24^{l}35.20^{ll}$ N	$111^{o}32^{l}12.32^{ll}$ W	plot75	36.02
76	$43^{o}24^{l}35.44^{ll}$ N	$111^{o}32^{l}12.93^{ll}$ W	plot76	36.02
77	$43^{o}24^{l}35.20^{ll}$ N	$111^{o}32^{l}20.79^{ll}$ W	plot77	24.85
78	$43^{o}24^{l}38.83^{ll}$ N	$111^{o}32^{l}20.47^{ll}$ W	plot78	24.85
79	$43^{o}23^{l}24.14^{ll}$ N	$111^{o}34^{l}10.19^{ll}$ W	plot79	10.12
80	$43^{o}23^{l}23.83^{ll}$ N	$111^{o}34^{l}10.37^{ll}$ W	plot80	10.12

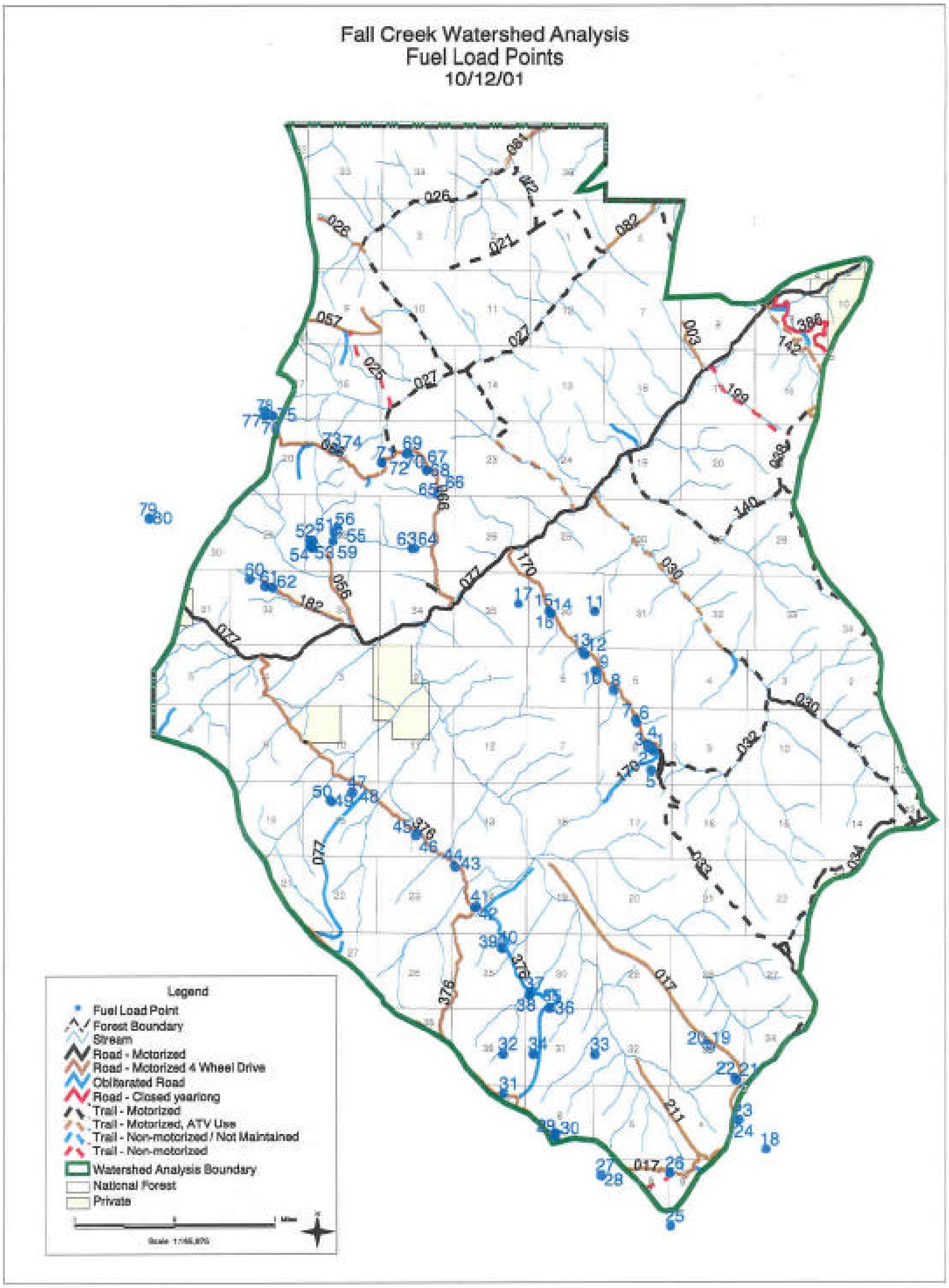


Figure 43: Fuel load points map.

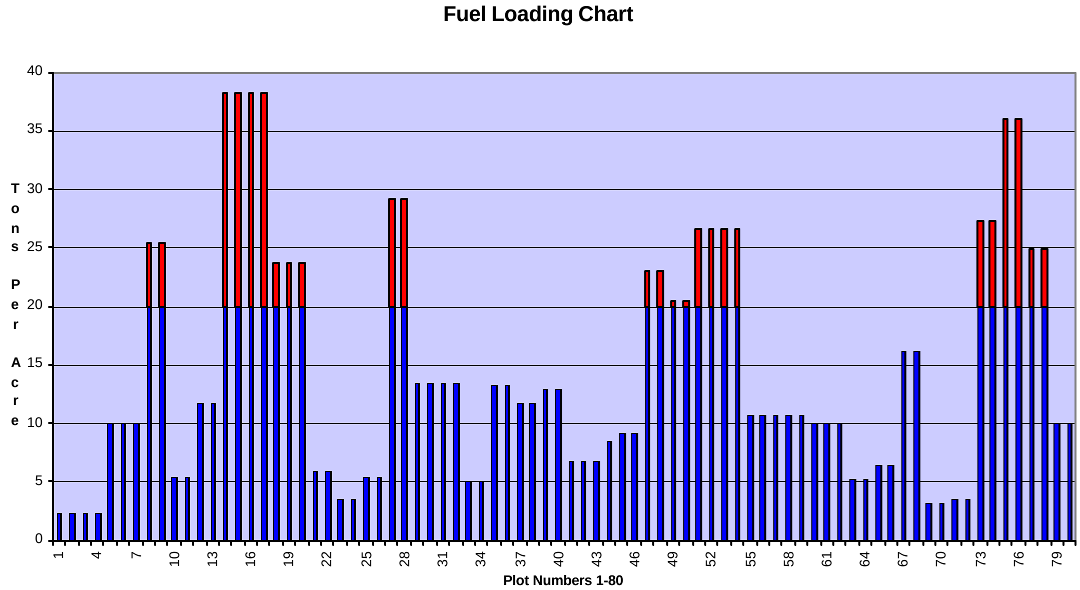


Figure 44: Fuel loading chart

The preceding graph, map and spreadsheet show the tons per acre (fuel loads), location and survey points within the Fall Creek Analysis Area. Goals established in the 1997 Targhee Revised Forest Plan (RFP 1997) direct management strategies to maintain or restore ecological integrity, productivity and sustainability over time. The graph depicts survey plots of different vegetation communities with various fuel loads. Ranging from mountain brush to timber types. Areas indicated in red above 20 tons/acre indicate a need for treatment within the watershed. There are photos of all survey plots on file and available for viewing.

Plot Survey's of low fuel loadings, Plot #1, Plot #2 and Plot #3.

Figure 45: Overall identification picture Rash Canyon.
This photo indicates low ground fuel loading but high ladder fuels in the overall area.

Figure 46: Rash Canyon Plot #1- 2.421 Tons/Acre
Herbaceous Fuels

Figure 47: Rash Canyon Plot #2
Herbaceous and down dead fuel loading.

The Caribou subsection is 60percent forested and 40 percent nonforested. The primary forest types are aspen (31 percent) and mixed lodgepole and Douglas-fir (47 percent). The interspersion of forest with sagebrush, grass/forb meadows and mountain brush provides good density of plant species.

Age class diversity is limited. Some limited timber management has occurred in the lodgepole pine/ Douglas- fir types. Almost no harvest has taken place in the Englemann spruce/subalpine type. Some 99 percent of the conifer forests are in mature or older seral stages. Douglas –fir is becoming more predominate as it encroaches on stands of lodgepole pine and aspen or shrubs. Evidence of insect attacks is readily visible in the Douglas- fir type and is increasing each year. It is likely that there is more Douglas-fir here now, and less aspen, lodge pole pine and scrublands, than historically. Fires have been suppressed for many tears. Because stands are scattered and difficult to access, this condition is likely to persist. Treatment opportunities center around prescribed burns and limited vegetation treatment where access is more easily obtained.

Most of the scrublands are also in late seral stages. Consequently, risks of large fires, insects and disease outbreaks are high. (FLMP 1997, III-64)

Figure 48: Rash Canyon Plot #6 – 10.094 Tons/Acre
Herbaceous, Shrubs, Litter and Down woody debris.

Figure 49: Rash Canyon Identification Picture
Grass, Forbs, down woody debris.

Habitats in which we have interrupted the natural fire occurrence through fire suppression have changed significantly. Shade tolerant species such as subapline fir, Englemann spruce and Douglas-fir, are able to colonize an area due to the absence of fire. These species tend to be more susceptible to insects and disease and colonize quickly to provide large accumulations of horizontally and vertically continuous fuels. The dominant, fire dependant species which thrive in the fire environment are now less vigorous due to the stress placed on them through competition for resources and the introduction of new pathogens to the stand. Approximately 90% of the area is characterized by short interval fire regimes. These stands, which historically burned in a mixed severity or non-lethal mosaic pattern, now have the potential to support a lethal/uniform stand replacing fire event. An event such as this tends to have much greater magnitude and intensity resulting in greater short-term and long–term effects to aquatic and terrestrial biota, air and soil quality, public and firefighter safety.

Figure 50: Rash Canyon Plot # 9 –25.345 Tons/Acre
Grass, shrubs and heavy concentration of down dead woody debris.

Figure 51: Rash Canyon Plot #13 – 38.292 Tons/Acre
Heavy fuel loading of down woody debris.

Structurally, timber harvest generally finds its conceptual silviculture basis in replication of fire effects. However, the "randomness" of wildfire on a stand level and micro site level cannot be duplicated. This randomness is an important element of fire effects within the ecosystem (R. Gordon Schmidt). The replication of wildfires by harvest activities is not a random instance as wildfire was historically, but the acres represented by timber harvest is close to historical wildfire numbers.

Fuel accumulations are increasing immensely and are setting the stages for high intensity, uncontrollable wildfires. Even though the plot surveys indicate some low tons/acre at this time the stand density and ladder fuels will contribute to the rapid buildup of fuels and increase the danger of large fire events.

Forest structure can be divided into four aspects; age structure, species composition, mosaic patterns and vertical structure or fuel ladders (Kilgore 1981). Each of these aspects can, and in most cases, has been modified by fire exclusion. The effects fire suppression has on the structure of a forest directly impacts wildfire, hydrologic function, insects, pathogens and aquatic organisms.

Barrett and Arno conducted research in the Selway-Bitterroot Wilderness Area and developed the concept of “fire regimes”. They found that each vegetative community responds to fire, or lack of fire, in similar ways. Habitat types have been grouped together by similar response patterns into the widely accepted fire regimes. A fire regime describes a plant community’s expected response to fire. In general terms, fire regimes give us a description of the type of fire effects can be expected for different layers of the forest vegetation. Stand replacing fire in which the majority of the trees killed tend to favor seral tree species while low intensity mixed severity fire would favor shade tolerant species. Tree species like Douglas-fir have a thick bark, which makes them better able to withstand the heat from forest fires. This tree is considered to be fire tolerant while subalpine fir and lodgepole pine have thinner bark and are more prone to die from fire’s heat and would be considered intolerant.

Each fire regime entails three descriptors:

1) Fire type and severity (i.e. lethal, non-lethal, mixed-severity),
2) Frequency of return interval (frequent, non-frequent),
3) And burn pattern (mosaic, uniform).

The four fire regimes present in the analysis area are each described separately:

Lodgepole Pine/Subalpine Fir (LPP/SAF) Fire Regime

The lodgepole pine/subalpine fire regime generally occurs on cool, dry habitat types at 5000 ft – 8000 ft elevation within the analysis area. Within the lpp/saf fire regime, there are two distinct response patterns to wildfire. A lethal, uniform spread pattern resulting in stand replacement is found in a mature lodgepole and subalpine stands. These stands have a return interval for fire at 155 years (Barrett 1993). Following a stand replacing fire, lodgepole pine predominates with Englemann spruce, Douglas-fir and whitebark pine present to a lesser extent due to elevation. Sub-alpine fir is a significant component and dominates the site in late seral stands.

On drier, less steep sites with lodgepole pine, “ underburning” in the form of nonlethal/non-uniform spread patterns may occur. The less intense surface fire consumes the fine fuels without causing extensive mortality to the trees. The Hardtime fire of 1991 on the Powell Ranger District was a perfect example of this type of burn. Hardtime underburned 117 acres of lodgepole pine within the Selway-Bitterroot Wilderness Area. Barrett and Arno (1991) reported a 43 year return for these types of stands.

Douglas fir/Subalpine fir/Englemann Spruce (DF/SAF/ES) Fire Regime

The Df/saf/es fire regimes occur on cool, moist northerly aspects, usually at higher elevations (5000 ft and >). Due to the high elevation and lower energy aspects, these sites generally do not dry out until late summer. Uniform, stand replacement fires are typical for this regime, however a mosaic pattern leaving stands or whole groups of live trees happens often. These stands are a result of fuel accumulations and much continuous ladder fuels over 190 year intervals (Barrett 1993). Mature stands have higher fuel accumulations and much continuous ladder fuel within the stand structure. Once started these fires produce higher intensities resulting in higher tree mortalities mainly as a stand replacement event. Seral species such as Douglas-fir, Englemann spruce, subalpine fir colonize after a stand replacing event. In late seral stands, Englemann spruce, subalpine fir become a major component with lodgepole pine dying out before 160 years if age.

Quaking Aspen (ASP) Fire Regime

Quaking aspen is the most widely distributed native North American tree species (Little 1971, Sargent 1890). It grows in a great diversity of regions, environments and communities. Aspen is a component of several vegetation types within the Fall Creek Analysis area, it grows in a broad range of elevations from 5500 feet to 8,000 feet at its highest elevation. Due to climatic conditions throughout the analysis area, the aspen sites rarely have an opportunity to burn naturally. The combination of dry weather and cured fuels in the aspen forest does not occur every year. Most frequently, it occurs in the autumn, sometimes in late summer, and occasionally in spring. Late September and October can be wet, but often have periods of dry, sunny weather. By then, the herbaceous understory is frozen and dead, is still largely upright, and can burn readly. Also, the aspen canopy loses its leaves in late September and October. If conditions are dry, a continuous layer of loosely packed, fine fuels develop, making the aspen more flammable in this season. In most years, however, aspen leaf-fall and the first heavy, wet snowfall of autumn coincide in much of the aspen range, particularly in the north. Uniform, stand replacement fires are non-typical for this regime, however a mosaic pattern leaving stands or whole groups of live trees happens often. Although aspen forest do not burn readily, aspen trees are extremely sensitive to fire. Despite the difficulty of getting fire to burn through aspen stands, the very sensitivity of the species, especially that of young trees, apparently would make repeated prescribed fires a viable tool for regenerating aspen on a site. A fire intense enough to kill the aspen overstory will stimulate abundant suckering but some suckers will arise after any fire. Low to moderate fire intensity will reduce the fuel loads on the ground but may not be hot enough to remove the overstory in the stand. On many sites, aspen may not persist unless the stand is periodically destroyed by some event that rejuvenates it by initiating a new stand. Without such an event, aspen can be displaced on many sites by conifers, shrubs or grass. This successional process is partially offset by aspen dominating areas where, fire, insects, or cutting has removed conifer stands. Stephen W. Barrett suggest the following fire frequency intervals in conifer-aspen stands to have a range from 16 to 97 years and the average mean fire interval of 45 years (S.W. Barrett, Final Report, Fire Regimes On The Caribou/Targhee National Forest,9/94, 25 pp).

Sagebrush/Mountain Brush/Grass Fire Regime

The sagebrush/mountain brush/grass habitats makeup some 40% of vegetation types within the Fall Creek Watershed Analysis Area. Annual precipitation for the area is normally around 20 inches annually, which usually comes in the form of snow between late October and the end of April. Rain showers are common in May, June and September with July and August generally dry. Temperatures range from a maximum of 90 degrees in the summer months to a mininum of < 30 in the winter months.

The mountain brush communities consist of chokecherry, serviceberry, bigtooth maple, rocky mountain juniper and curleaf mountain mahongany wich make up approximately 23% of this habitat. The non-forested areas also include: mountain big sagebrush (A. tridentate), snowbrush (Ceanothus velutinous), bitterbrush (Purshia tridentate), snowberry, horsebrush and rabbitbrush. Major grass componets are: Kentucky bluegrass (Poa Pratensis), mountain brome (Bromus carinatus), slender wheatgrass (Agropyron traahycaulum) and bluebunch wheatgrass (Agropyron spicatum).

The forb component for the drier sites include: balasamroot (Balsamorphylla), Arrowhead Balsamroot (Balsamorhiza sagittata), Weaten Hawksbeard (Crepis occidentalis). And Buckwheat (Eriogonum caespitosum). On moist sites the forb component consists of Meadow Goldenrod (Solidago Canadensis), Cow Parsnip (Heracleum lanatum), Mountain Bluebells (Mertrnsia ciliata, and tall and low Larkspur (Delphinium occiddentiale and nelsoni).

Treatment of sagebrush and mountain brush has been occurring in the analysis area since 1945. Prior to human suppression of wildfire the area had burned several times within the last 200 years judging by the old fire scars. The cycle required for treatment of sagebrush to maintain a desired canpony of 25 to 30 % appears to be about every 15 to 25 years (S.C. Bunting, B.M. Kilgore and C.L. Bushey, Guigelines for Prescribed Burning Sagebrush-Grass Rangelands in the Northern Great Basin).

FORESTS

The forested vegetation in the analysis area was established through fire and succession. Succession is a progressive change in species. Very little vegetation manipulation has occurred in the timbered stands that comprise the analysis area. Early logging (Tie Hacking) has occurred in much of the area where horse logging was possible. Old stumps remaining from this logging can be seen in many areas.

Fires in this analysis area have been successfully suppressed for the last 90 years. Recently, fire suppression has reduced fire frequencies and has allowed plant succession to continue towards later seral conditions (Steel, 1983). The lack of disturbance such as fire in the analysis area has lead to the current structure and composition of the stands. Historically, fire free intervals in the moist Douglas-fir habitat types ranged from 15 to 30 years (Arno, 1980). Fire intervals in the mid and lower elevation subalpine fir habitat types are estimated to be 50 to 130 years (Bradley, 1992). Fires in this type usually lead to dominance by one or more seral species such as aspen, created openings in dense stands, and create a mosaic of different ages & species compositions (Bradley, 1992).

Aspen exist in primarily three different types (Bartos and Campbell, 1998a) (1) stable, (2) successional to conifers, and (3) decadent and falling apart.

Stable aspen is considered to be "properly functioning" and replacing itself (Bartos, 2000). In many instances, these clones exist with a "skirt" or "fairy ring" of young regeneration around the edge and numerous sized stems in the interior. The stems are of various ages that resulted from pulses of regeneration that occurred at various times in the past. Generally, an individual standing near a stable clone has difficulty seeing into or through it. This is generally not the case in the analysis area.

Aspen succeeding to conifers are responding to natural forces. Aspen is considered a disturbance species perpetuated on site by fire, disease, or other such occurrences (Bartos, 2000). Some of these forces (primarily fire) have been altered by human intervention, which has given shade-tolerant conifers a marked advantage. In this analysis area, there are numerous situations where less desirable vegetation types such as subalpine fir or sagebrush are replacing aspen. In turn, these type conversions are modifying the sites dramatically.

Decadent clones are generally of a single age and are very open; mature trees are not being replaced as they die because successful regeneration is lacking. Most of these clones attempt to reproduce, but the new shoots are consumed primarily by wild or domestic ungulates. Clonal vigor is reduced as these regeneration events occur year after year. A person standing near a decadent clone can see into or through theclone.

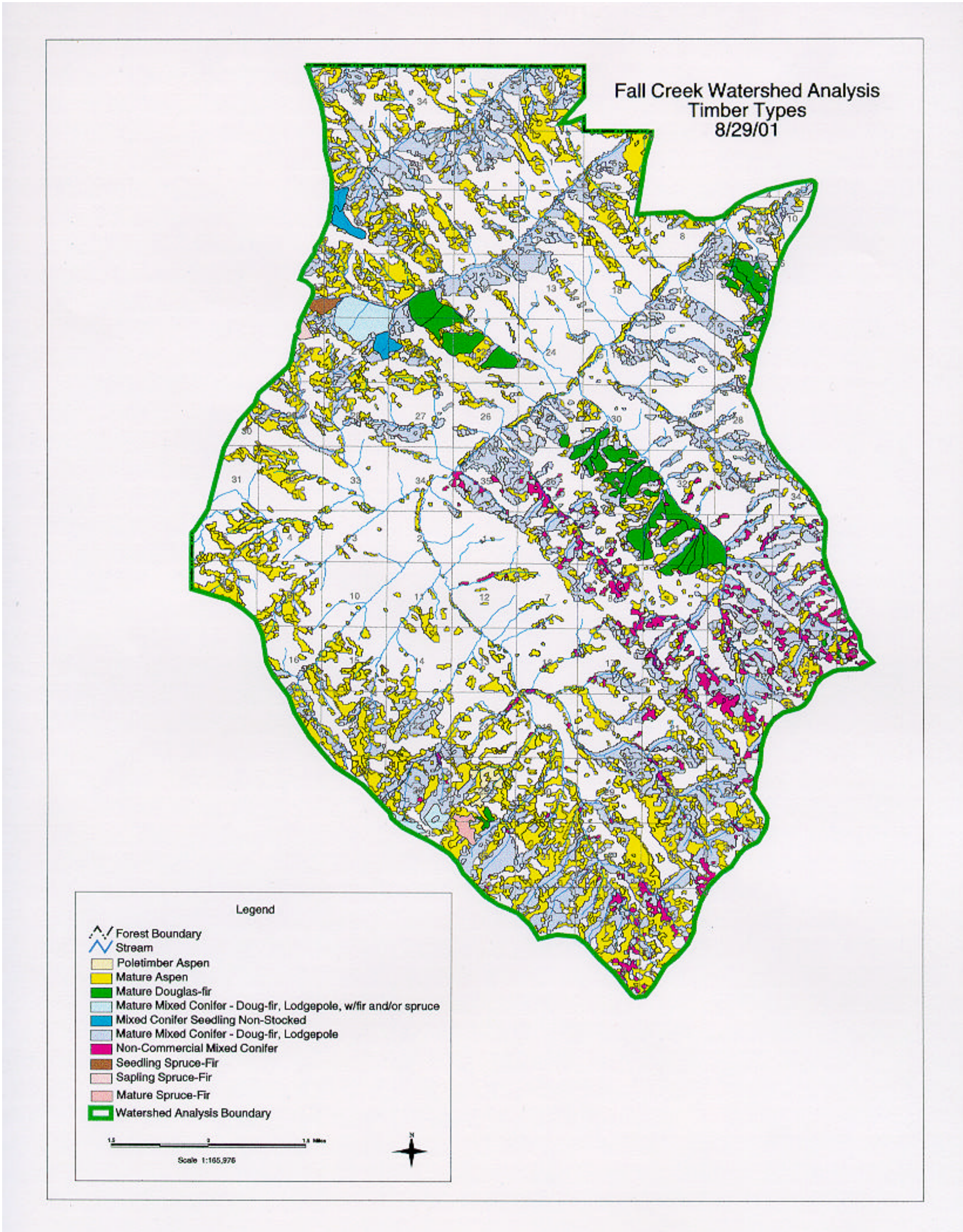


Figure 52: Fall Creek Watershed Analysis Timber Types

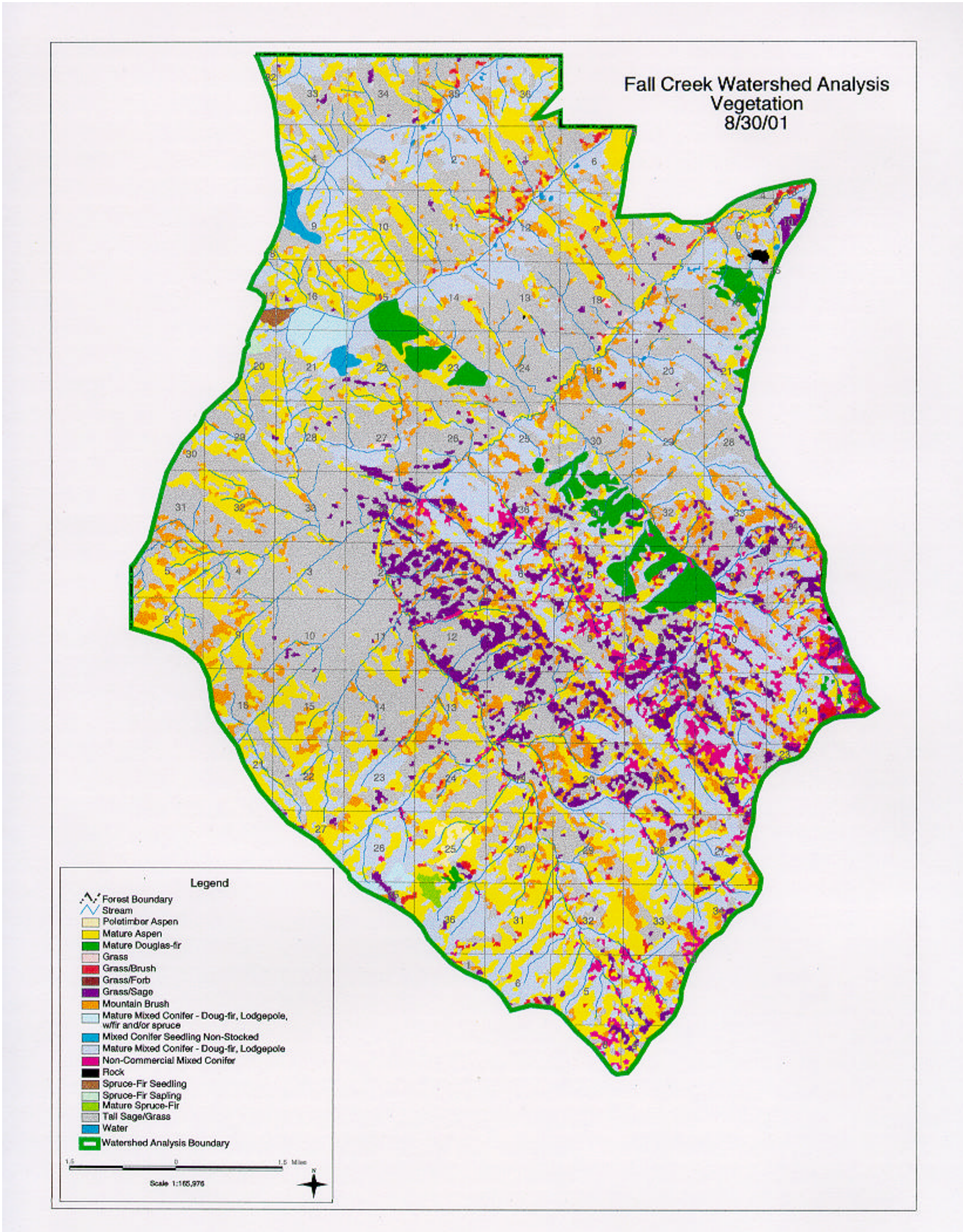


Figure 53: Fall Creek Watershed Analysis Area Vegetation

RANGELANDS

Existing Vegetation

The creek bottoms tend to be lined with willow and dogwood with a variety if grass and forbs growing across the meadows and mountain slopes. The brush (serviceberry, chokecherry, and hawthorne) component is very heavy on the north and east slopes of the analysis area. Aspen stands adjacent to stream ways are being effected by the beaver population and suckering is probably be set back by cattle use. Aspen away from the streams are healthy with a good variety of all age class.

The current stocking levels of these allotments allow the permittees to run the full number of permitted livestock for the permitted season. Due to past reductions on all of the allotments and improved management, the vegetation is on an upward trend thought the watershed. There are isolated areas where vegetation is on downward trend or in a degraded condition. These areas tend to be heavily used watering, bedding and loafing spots.

Many of the sheep allotments have been consolidated, such as Beaver-Commissary, Home Ridge-Red Peak, and Mahogany (was South Fork and Rash Canyon) Allotments. These at one were six allotments supporting 6,000 sheep. Now they are three allotments supporting 3,000 sheep. Not since 1960 with implementation of allotment fences for cattle has any dual use by cattle and sheep occurred, except for an occasional stray.

The Point Lookout allotment was increased in size by 1000 acres when the Garden-Prichard sheep allotment was closed for watershed protection.

The Lone Pine allotment is grazed in the fall (after September 1st) only.

The Conant valley allotment has been divided in to three units. It has two upland units and a riparian unit. The Riparian unit is scheduled to be grazed for a three-day period each season.

The Fall Creek Cattle Allotment is divided into 5 units. Two units receive total rest every other year. The other three units are on a deferred rotation system. The cattle herd is split in two groups and some years and two units are grazed simultaneously. The permittees on this allotment are required to have a fulltime rider to aid in the distribution of the permitted livestock.

The Snake River Cattle allotment has a complicated rotation system of rest and deferment of the eight units on this allotment. The permittees on this allotment are required to have a fulltime rider to aid in the distribution of the permitted livestock.

Table 25: Current Condition of Grazing Allotments

Allotment	Season of use	Permitted number of livestock	Grazing system	Remarks
Bagley C&H	10-16 to 11-16	27		This allotment is used in conjunction with private land
Conant Valley C&H	7-21 to 9-4	100	Deferred rotation	Only one pasture has riparian areas and it is used for 3 days.
Fall Creek S&G	6-6 to 10-10	784	Modified 5 pasture rotation 3 units are deferred and two are rested	Permittees are currently working with us to improve the rotation system. They are splitting the herd into two different units at one time. An association of 4 permittees manages this allotment.
Snake River C&H	6-1 to 10-15	623	Modified rest rotation	An association of 4 permittees manages this allotment.
Beaver Commissary S&G	6-26 to 9-15	1000	Four pasture rest rotation	
Golden Gate S&G	7-6 to 9-15	1000	Six pasture rest rotation	
Home Ridge Red Peak S&G	6-26 to 9-9	1200	Four pasture rest rotation	
Lone Pine S&G	9-1 to 10-1 9-10 to 10-1	1500 1200	Deferred rotation	This allotment is ewes only
Mahogany Ridge S&G	6-16 to 8-30	1200	Four pasture rest rotation	
Point Lookout S&G	6-16 to 8-30	1000	Deferred rotation	This allotment has been rested due to the prescribed fire in Garden and Pritchard Creeks

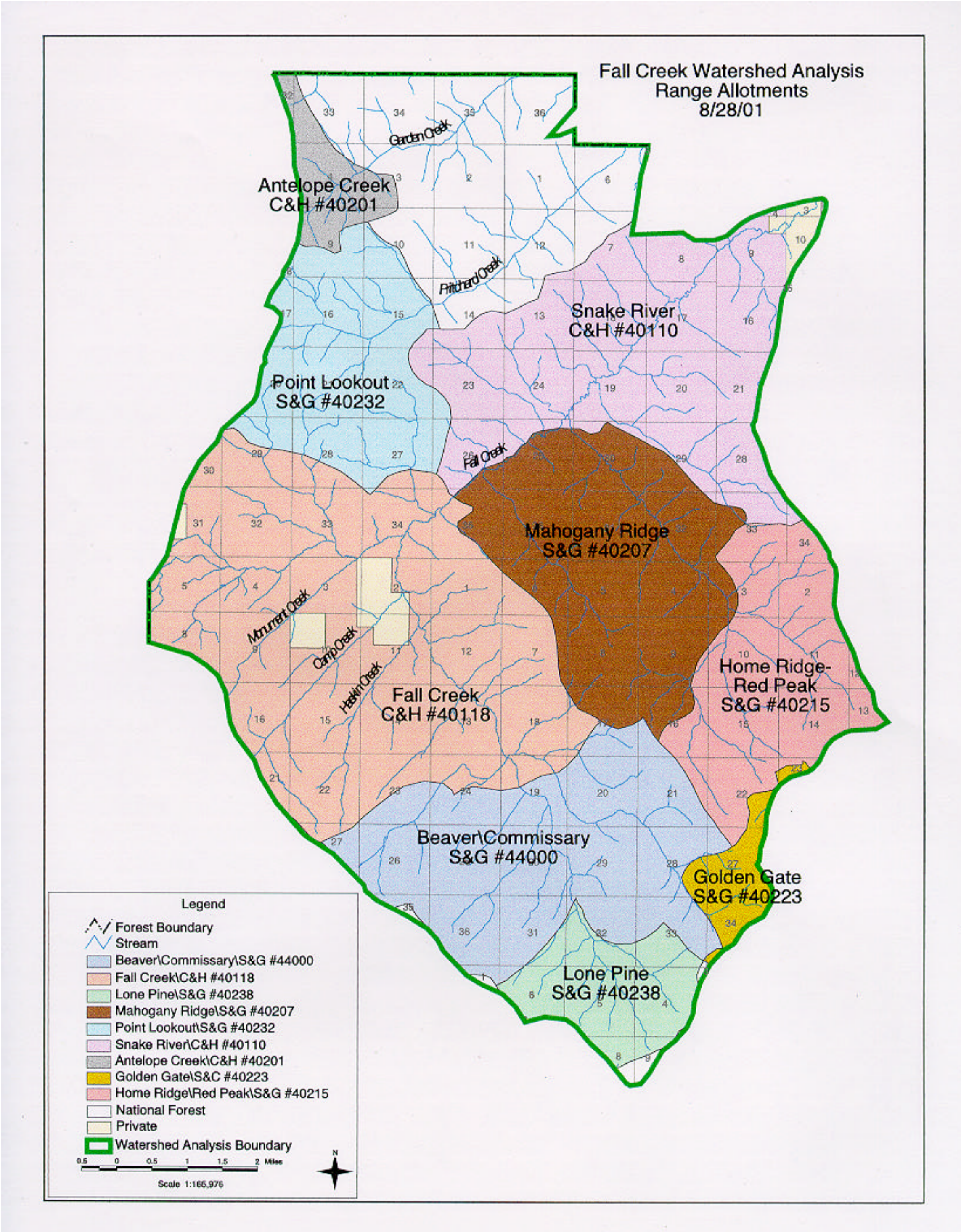


Figure 54: Fall Creek Watershed Analysis Range Allotments

FISHERIES

Fall Creek

Fall Creek was surveyed by the Caribou-Targhee National Forest Fisheries Crew in 1999 (USDA Forest Service 1999). The lower valley riparian vegetation was dominated by a wet willow, hawthorn, and sedge/grass community with lesser amounts of sagebrush. The surrounding slopes were dominated by grasses and a low shrub layer with little cover value. The lower reach (from Echo Canyon to Calf Hollow) was a C3 Rosgen type with a well developed floodplain. The stream was moderately entrenched, with a relatively sinuous meander. Mineral seeps were apparent throughout the eastside of the riparian edge adjacent to Little Current Hollow. The upper reach appeared to be moderately unstable with high bank and stream channel erosion documented. Stream channel stability for the entire stream was rated as good.

Figure 55: Typical lower Fall Creek during 1999 fish distribution survey.

The South Fork of Fall Creek was also sampled by the Forest fish distribution crew in 1999 (USDA Forest Service 1999). The South Fork was a major tributary to Fall Creek, providing 60% of flow at the confluence. The South Fork Drainage was a mix of C3 and B4 stream types derived from a narrow, gently sloping valley. The lower reach had a cool water temperature of 8C near the end of July. Turbidity was high in this reach. Channel braiding, aggradation, and instream willow clumps were frequent and didn't help to confine the stream. The surrounding vegetation was meadow type, with the upper slopes sparsely wooded with junipers. Banks were mostly sloped, but some were vertical. Water clarity was affected by suspended sediments in the lower units of this reach and gradually improved upstream. Sedimentation and aquatic vegetation were present throughout the lower reach. The upper units of the lower reach were moderately confined with compacted substrate that appeared to be cemented together. Young of the year trout habitat was poor due to this concreted substrate. FS Road 85 paralleled the lower reach. This 2-track road was deeply rutted and greatly impacted the quality of the riparian area.

The upper reach of the South Fork of Fall Creek meandered through a meadow community. The upper valley was not confined, allowing the stream to access its floodplain. There was low bank stability, high turbidity, and high conductivity. The stream substrate was dominated by gravels and fines. Water temperatures ranged from 10-14 C in late July. The upper unit had good vegetative cover. The upper southwest slope was forested. Bank stability was better here and willows provided good overhead stream cover. Brook trout dominated the upper reach (USDA Forest Service 1999).

The Forest Fish Distribution Crew documented cutthroat trout, brook trout, sculpin, longnose dace, and speckled dace in Fall Creek (USDA Forest Service 1999). Brook trout are the major salmonid in Fall Creek. Due to the lack of past stocking of cutthroat trout in Fall Creek, it is likely the remaining cutthroat trout are genetically unique due to their isolation, if they have not been affected by rainbow trout introgression.

FS Road 077 parallels Fall Creek along its lower 8.2 miles. Road segments share road shoulder with stream bank. This road encroachment upon the stream is a source of road sediment to the stream and impacts the quality of the riparian area by decreasing riparian vegetation and shading. Rip rap has been applied to the stream banks at these stream/road interfaces and they continue to be maintained by the county who is responsible for maintenance of this road.

Figure 56: Riprap along Fall Creek Road, September 2001.

The crossing with likely the most impact upon Fall Creek is the Rash Canyon Ford. The stream has been significantly widened and shallowed at this crossing and the approaches to the stream are sediment sources.

Figure 57: Ford through Fall Creek at Rash Canyon, September 2001.

Motorized vehicle use in Fall Creek Drainage has significantly increased between 1960 and today (Brunson 2001, Haderlie 2001, Payne 2001). Impacts to riparian areas and stream channel condition from this increase in use are observed at the crossing at Rash Canyon and near South Fork Fall, road encroachment upon Fall Creek and resulting riprap along FS Road 077 and upon the South Fork along FS Road 085, and erosion and sedimentation on upper Fall Creek Trail/Road.

Figure 58: Ford through Fall Creek at South Fork, September 2001.

Figure 59: Results of a past streambank stabilization project, September 2001.

In September 2001, 13 major dispersed camping sites were documented between Fall Creek Road and Fall Creek in the reach between the Forest boundary and June Creek. Six of these sites have unstable, eroding streambanks associated with them. Five of the 13 dispersed sites have little to no vegetated riparian buffer between them and the stream, allowing sedimentation and easy human access to the stream. In early September, little ground in and around the dispersed camping sites was classified as bare. There may be more after the hunting season, particular if conditions are wet. Considering the low surface area affected and the low frequency of dispersed sites contributing impacts to the stream, dispersed camping currently has low impacts upon stream habitat quality. The impacts documented (a total of approximately 280’ of eroding stream banks) could be addressed by limiting vehicle access at the site with strategic rock placement.

Several riparian community types exist along Fall Creek. Riparian trees include Douglas fir, lodgepole pine, juniper, cottonwood, alder, and quaking aspen. Shrubs include willows, dogwood, and sagebrush. Forbs and grasses are also present.

Clark (2000) surveyed the Fall Creek macroinvertebrate community for indications of habitat quality and biodiversity. Three sites were sampled. While data from 2 of the sites were considered too close to assign a rating, 1 site rated as not impaired. All 3 sites have cold water macroinvertebrate indicator species, indicating that stream temperature was not a problem. No Ephemeroptera or Plecoptera were present in the upper site (Upper Fall Creek), indicating the habitat was impacted by fine sediment.

Figure 60: Upper Fall Creek Road/Trail. Note bare soil and proximity to Upper Fall Creek. Upper Fall Creek was dry in September 2001.

Figure 61: Upper Fall Creek Road/Trail. Note bare soil and rutting.

Pritchard Creek

Raleigh Consultants surveyed Pritchard Creek for the Targhee National Forest in 1991. The objectives of the survey were to assess fish habitat conditions, determine causes and locations of stream bank impacts, and recommend restoration measures (Raleigh Consultants 1991). The stream was surveyed from the Forest boundary upstream to the confluence of the headwater forks. Two reaches were established, based on Rosgen channel type classification.

The lower reach began at the Forest boundary and extended 2.4 miles upstream to a large beaver dam. It was described as meandering with side channels and marshy areas. There were a few eroding stream banks and moderate bank damage from cattle. In general, the stream banks were in fair condition. The stream substrate was documented as 49% silt, 29% gravel, 11% rubble, 8% cobble, and 3% boulder. Critical areas that were excluded from cattle by fences and the riparian area appeared to be responding.

The upper reach extended 4.3 miles upstream from the large beaver dam to the headwater fork confluence. The beaver complex associated with the dam at the start of the reach was extensive, inundating most of the valley. From where the road crossed the middle of the reach upstream, the riparian vegetation was dense. The stream substrate was composed of 47% silt, 34% gravel, 11% rubble, 7% cobble, and 1% boulder.

Although the surveyors from Raleigh Consultants reported brook trout as common in Pritchard Creek, they likely misidentified cutthroat trout as brook trout. The 1999 fish distribution survey by the Caribou-Targhee National Forest Fish Distribution Crew corrected their mistake. Only Yellowstone cutthroat trout were collected in Pritchard Creek. Both Resident and Fluvial life history patterns occurred in the stream. In addition, both fine spotted and large spotted varieties occurred in the same habitat types (USDA Forest Service 1999).

The Forest Fish Crew described Pritchard Creek valley as confined. The lower stream reach upstream of the old reservoir bed had thick, overhanging dogwood providing excellent fish cover. A fine coating of sediment covered most of the stream substrate. Grasses and forbs also occurred in the riparian area. There were some undercut banks and debris jams providing excellent cover for fish. The stream banks were 95% stable. Beaver activity, past and current, was reported in the upper reach. In this reach, the channel meandered. Although fines still covered the stream substrate, they were less frequent than the downstream reach. The water temperature at the end of July ranged from 9 to 14 C.

The Caribou-Targhee National Forest Fish Crew determined there was a density of 48 fish per 100 meters (USDA Forest Service 1999) where IDFG determined there were 59 fish per 100 meters in 1979 and 41 in 1980 (Moore 1980). These numbers are considered average when compared with other population densities in nearby streams, but low when considering the size and potential of Pritchard Creek. They reflect the lack of recovery even after the restoration efforts that occurred in 1987.

Forest Fisheries Biologist Capurso visited lower Pritchard Creek (from private land upstream to the old reservoir bed) in September 2001. The stream was trending towards recovery in the BLM and Conant Valley Ranch exclosures. They had fenced off their land and riparian shrubs were returning along the stream. The stream was re-establishing its meander pattern through the gully that was apparently cut out when the dam failed. The stream channel was narrowing and deepening within the gully. Aquatic vegetation was frequent, providing excellent cover for the Yellowstone cutthroat trout that also appeared to be frequent.

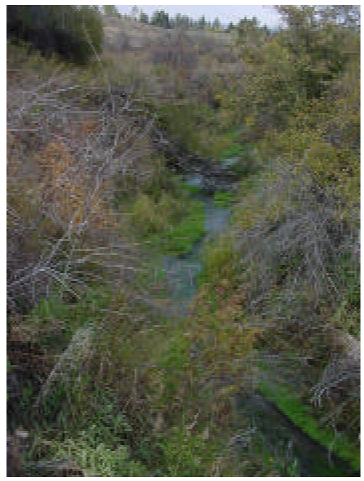


Figure 62: Pritchard Creek in BLM exclosure, 9/01. Note narrowing/deepening channel and vegetation growth.

The recovery trend noted on private and BLM ground was not continued on the USFS Land upstream to the old reservoir bed. Cattle had free access to the stream, entrenched in the gully. Bare stream banks were frequent and continued to erode into the stream. Developing stream bars were trampled. There was a noticeable difference between the vegetation recovery in the private exclosure and federal ground. Woody shrubs in the riparian area were less frequent and often grazed. In the old reservoir bed, most stream banks were still vertical and actively eroding. The problem has been sustained and exacerbated by heavy cattle use. The stream restoration structures placed along the channel margins were no more than thin tree stems tied off to fence posts. The unnaturalness of the green metal fence posts spread along the streamside added to impacts to this stream reach.

Figure 63: Pritchard Creek near old reservoir bed, 9/01. Note thin tree stems and metal posts left from past restoration project. Also note cattle trampling and stream sedimentation and nutrification.

Figure 64: Woody riparian species grazing and highlining in Pritchard Creek upstream of exclosure, 9/01.

Figure 65: Riparian area tramping and stream widening by cattle in Pritchard Creek, 9/01.

Garden Creek

Four months after the initial 1999 fish distribution survey in Garden Creek had identified the high fuel loads on the slopes and riparian area, a prescribed fire in Pritchard Creek Drainage escaped into Garden Creek Drainage. It burned the riparian area of Garden Creek completely and contiguously from 100 yards downstream of the headwater forks in Section 4, downstream for about 1 mile. In this 1-mile stretch, most of the willows and dogwood were burned within a foot of the ground or completely removed by fire. The threats of bank instability and amounts of sediment delivered to the stream were high (Mabey 1999, Leffert et al 1999).

Figure 66: Burned riparian area along Garden Creek, 10/99.

In June 2000, the Caribou-Targhee National Forest Fisheries Crew returned to Garden Creek to monitor the effects of the fire by revisiting their 1999 fish distribution survey units. Reach 1 was unaffected by the previous year's fire. The riparian vegetation was still dense and consisted of red osier dogwood and willows in the understory and lodgepole pine and Douglas fir in the overstory. High levels of fine sediment were observed in the stream substrate, although the dominant substrate was gravel and cobble. This fine sediment was a likely result of the fire upstream. Reaches 2 and 3 were affected by the fire. In many places, the riparian area had been completely incinerated by fire, where it used to consist of thick alders, hawthorn, and willows. Burned lodgepole pine and Douglas fir occurred in the overstory. The understory was dominated by thistles, but willows and forbs were beginning to reestablish. Each reach was rated for stream channel stability and found to be good to fair (USDA Forest Service 2000).

Figure 67: Garden Creek in burn, 1 year after, 6/00.

Figure 68: Garden Creek in unburned area, 6/00.

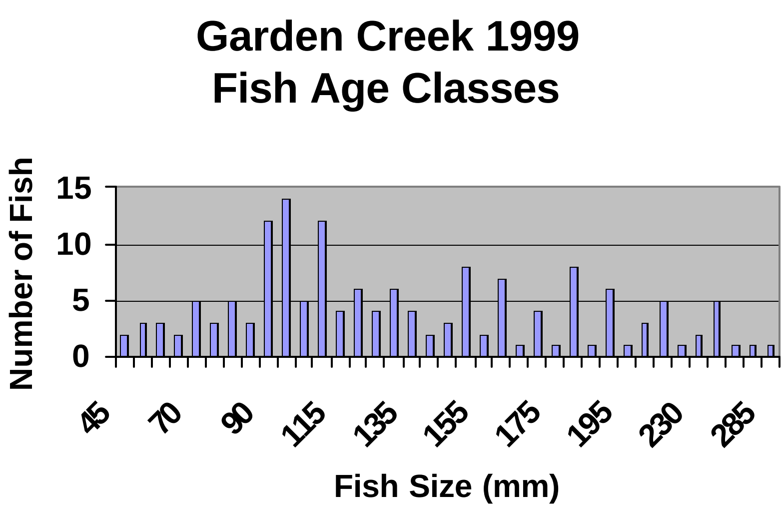
Figure 69: Surveying the burn in Garden Creek, 6/00.

In 2001, the Caribou-Targhee National Forest continued to monitor the Garden Creek fire. The 1999 fish distribution survey units were revisited. Sediment was noted in the stream within and downstream of the burn. Within the burn, there was frequent large and small instream wood. Channel stability ratings were fair to poor. The stream and its surrounding slopes were revegetating nicely. Fish population density comparisons were made between sampling years and are presented in the Trends section.

Figure 70: Upper Garden Creek within the burn. Note extensive vegetation regrowth, 7/01.

There appears to be 4 age classes of Yellowstone cutthroat trout in Garden Creek, as depicted below. Each year, the stream was sampled in June. The cutthroat trout eggs were developing in the gravel during the survey. Excluding the developing eggs, the 1 year old fish sizes generally ranged from 45 to 100 mm. The 2 year old fish sizes generally ranged from 100 to 130 mm. The 3 year old fish sizes ranged from 130 to 170 mm. The 4 year old fish sizes ranged to sizes larger than 170mm. The bar graphs below were developed to determine the age classes. In addition, age classes can be tracked through time. For instance, notice the relatively large 2 year old age class in 1999. You can track it through to 2000. It diminishes in 2001. In 2001, another strong age class is evident at age 1. Future data will likely indicate other trends.

Figure 71:



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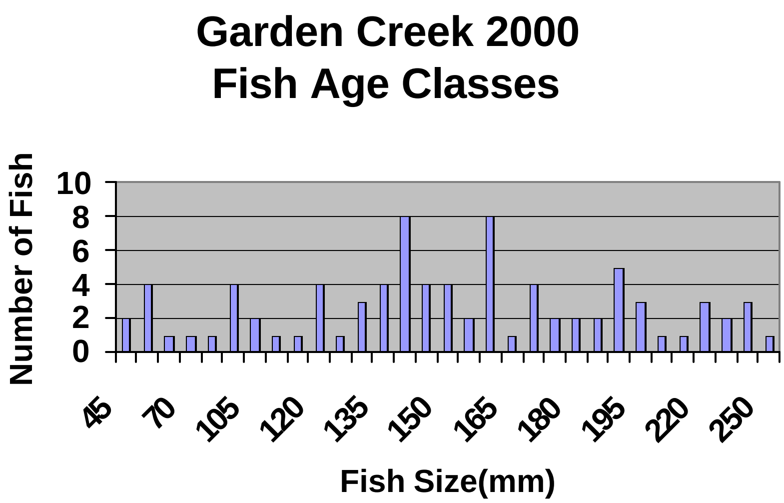

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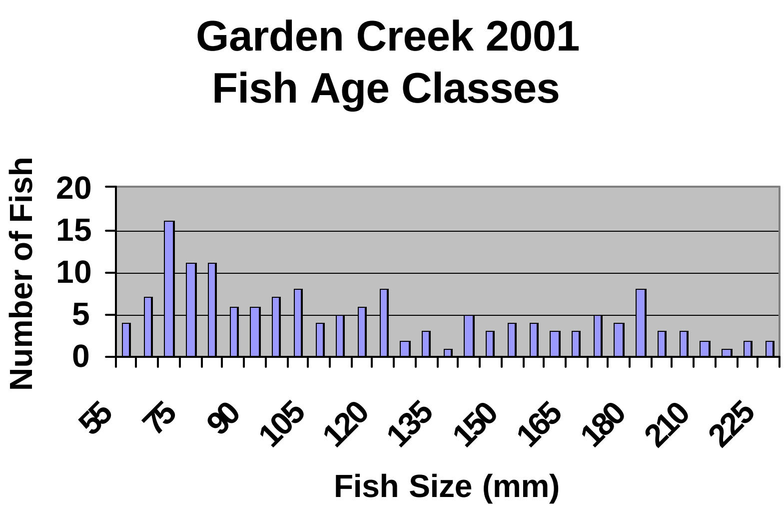

WILDLIFE

Wildlife Habitat and Fire Influences

The 60,033 acres covering these watersheds have a diversity of vegetative species. North facing slopes have mixed forests of subalpine fir, Douglas fir, lodgepole pine and quaking aspen mixed with mountain maple and other mountain brush including elderberry, currant and snowberry. South facing slopes are dry, with grass, shallow soils, sagebrush and bitterbrush. Curl leaf mountain mahogany is present on south facing slopes and dry rocky ridges. Much of the mahogany has been highlined by game years ago. Rocky Mountain juniper is often near the stream bottoms and serves for winter game cover. Only a few cottonwoods are found in the lower creek bottoms. Cottonwood gallery forest is a major part of the South Fork of the Snake River bottom from Fall Creek downstream to Garden Creek. Sagebrush and bitterbrush benches are located in the upper Fall Creek basin which is interspersed with aspen clones which gradually blend into the north slope conifer of Skyline Ridge and other ridges. There appears to be both aspen which is ecologically stable and aspen which is seral to conifer depending on the microclimate. Refer to figures below.

Figure 74: View from Skyline Ridge looking down Monument Creek of the upper Fall Creek basin sagebrush and aspen habitat including the Quarter Circle O private land. View is out the Fall Creek canyon with the Grand Tetons in the background to the north. North slope conifer and aspen mix is just below the hill in front of the photographer. Haze is from wildfires during summer 2001.

Figure 75: Typical mixed forest of aspen and conifer in Garden Creek.

Wildfire and prescribed fire has been an important part of the ecosystem in these watersheds. Currently, fire has been lacking in the more forested portions as shown in figures 8 and 9 due to fire suppression activity beginning at the turn of the century. The exception is open sagebrush areas as shown in figure 7. Planned ignitions to reduce sagebrush to improve livestock and elk forage has been part of the basin for decades. Some sage stands ignited as part of prescribed burning up to 20 years ago are already returning to pre-burn levels of 20 percent or more canopy cover.

Figure 76: Typical mixed conifer habitat edges with sagebrush types near ridges and south facing slopes.

Figure 77: Shows north slope conifer burned in fall 1999 fire. Photo is 2 years later with regrowth of native grasses, forbs and browse (eg. snowberry) in understory.

In the fall of 1999 the Pritchard Creek Prescribed Burn was ignited. It treated 2640 acres of various habitats including conifer shown in figures 10 and 11. A wildfire condition occurred when a sustained wind blew it into Garden Creek, but still helped meet the desired prescribed fire objectives.

Wildfire ignitions are mainly from lightning. In dry summers they may become bigger. Generally, during the recent past fires have had little chance to grow very large due to the fast action from Forest Service fire crews and smoke jumpers. In 1966 a man-caused start from a camp fire caused the Currant Creek fire on the north slope of Fall and Currant Creeks. There were also other fires in the area on the south facing slopes. These southern exposure fires removed sagebrush and bitterbrush important to big game. In many of the harsh dry south slopes the brush has yet to return as it was. In more moist areas it has returned.

Figure 78: Garden Creek 1999 fire removed conifer competition for aspen. See the new growth of sprouting quaking aspen clones which was released.

Figure 79: 1966 Currant Creek wildfire that burned in Fall Creek. This photo is 35 years later in the fall of 2001. Willows along the Fall Creek riparian area are in the foreground.

Riparian Conditions and Beaver

For willow riparian zones the current conditions vary from poor to excellent with the majority in good to excellent category in Pritchard, Garden and Fall Creeks. Poor conditions are localized and have been caused primarily by a long history of livestock grazing and more recently by increased motorized camping and off highway vehicle use in the riparian zone of Fall Creek. Refer to Range, Hydrology and Fishery sections for more detailed information on these effects. Areas of lower Pritchard Creek, lower and upper Fall Creek have needs for willow habitat rehabilitation work.

Next to man, the beaver probably has more of an influence on other species that any other vertebrate. So very many species in these watersheds are dependent on riparian habitat in good condition such as waterfowl, other furbearers, songbirds, small mammals, big game, raptors and so forth. Beaver are important not only for fishery habitat, but for creating ponds and raising water tables which foster the continued growth and health of the willow type. Beaver seem to do better in small streams where high spring flows do not knock out the dams so easily. That is, if enough willow, etc is present for food and building material. When adjacent aspen clones are available larger diameter material is used in the dams besides willow. Aspen is often clear cut next to beaver streams and if livestock grazing is too heavy clones can be damaged.

Figure 80: In Trail Creek in the upper Fall Creek watershed beaver have logged the aspen clones back a good distance from the streamside.

Figure 81: Note the larger and older aspen that have not been impacted. It does not appear that livestock grazing has been a major problem here since the aspen clones are still re-sprouting.

Currently, beaver are active in lower Garden Creek and Pritchard Creek. Fall Creek beaver population also seems fairly healthy. Trevor Hill (pers. comm 2001) has been trapping beaver and other furbearers in Fall Creek and along the South Fork of Snake River in this area for 19 years (since he was 6 yrs old). He indicates that there are a few beaver below Echo Canyon in the marshy area there, but the heavy pocket is below Rash Canyon along Fall Creek. There is a lodge there, and in recent years beaver were near the Currant Creek burn (see figure 12). Most beaver are below Rash Canyon, but also in the upper main Fall creek above where it joints with Trail Creek. In the winter of 2000 – 2001 he trapped about 50 beaver along the South Fork of Snake River from above Falls Campground area down to below Conant Valley. He indicates that he took about 50 muskrat out of ponds below Echo Canyon in Fall Creek (2000-2001) and has seen otter tracks at the Fall Creek bridge above the waterfall. Mink have been taken near the warm travertine springs and near Indian Camp Hollow (Hill 2001).

Figure 82: Fall Creek falls at low flow where it enters the South Fork of Snake River. Hill (2001) has reported otter and lynx sign (Lewis 1998) near the falls and Kellogg (2000) has reported wood duck in same location. Alford (2001) sighted a Harlequin duck along the banks just below the falls on the river. Photo: Bud Alford

The Fall Creek falls are a special riparian habitat feature along with the travertine springs along Fall Creek. Travertine springs go for about a mile along Fall Creek. From top to bottom the riparian habitat of Fall Creek is fairly good, but could be better. The interface of Fall and Pritchard Creeks with the river is important habitats for a great variety of wildlife. Fall Creek falls is the gem on the South Fork in many ways.

Big Game

These watersheds contain some of the most important mule deer and elk winter range on the Palisades Ranger District and along with the Idaho Department of Fish and Game's Tex Creek Wildlife Management Area provides the winter habitat for the summer – fall herds in Game Management Units 66 and 66A. The upper Garden, Pritchard and Fall Creek drainages are an important spring and fall migration route for herds which concentrate in Tex Creek Area. A considerable amount of data have been collected on these herds in the recent decades and reports are available (IDFG 2001, Brown 1982, Thomas 2001, Naderman 2001). Summer deer and elk habitat is equally important.

Figure 83: Winter Range in Currant Creek area in Fall Creek.

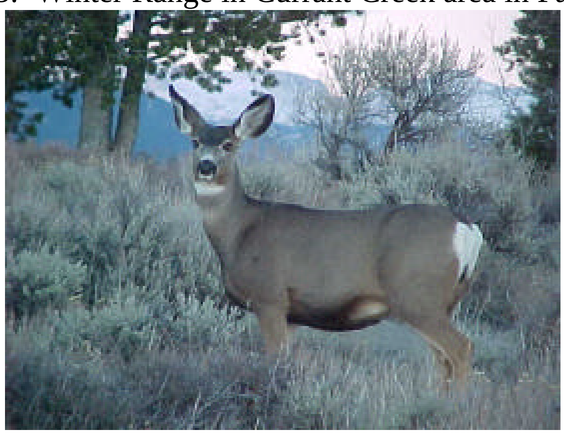

Figure 84: Shows mule deer in native sagebrush habitat mixed with forested edges. Photo credit: Bud Alford.

The mule deer population at the current time is believed to be low compared to the highs of the early 1990's and 1960's. Refer to the table below.

Table 26. Above shows Unit 66 Mule Deer Population Data (IDFG 2001)

Year	1965	1968	1973	1974	1976	1983	1984	1991[1]	1994[2]	1997	1999
Total Deer	1,615	1,995	381	600	231	579	242	1,098	450	667	536

[1] Partial count; stratified random sample of sub-units counted.
[2] Poor counting conditions; lots of bare ground, no new snow, many deer in conifer.

The Idaho Department of Fish and Game objectives for unit 66 where these watersheds are is to maintain a minimum of 15 bucks per 100 does in post season, and to maintain a minimum of 30 percent 4 point and larger bucks in the general harvest. The objectives for the analysis area (units 66 and 69) have been met in this past year. Counts estimate 21 bucks per 100 does and 41 percent of bucks were $\geq$ 4 points in 1998-2000. Unit 66 has a long running late-season controlled buck hunt, and this hunt is very popular (IDFG 2001). If the current series of mild winters continues this highly productive population will respond positively.

Elk populations numbers are currently doing well in the Unit 66 and 69 analysis area and this has been a popular hunting area with the public. Refer to table 3.

Table 27: Shows Upper Snake Region Elk Population Data, Units 66 and 69 (IDFG 2001).

Year	70-71	79-80	82-83	83-84	88-89	90-91	91-92	94-95	96-97	99-00
Count	1333	2040	1772	1918	3065	3509	3181	3589	3110	4256
Estimate	--	--	--	--	--	3781	4085	3804	3623	4293

There is more to elk habitat management than the total number of animals. Wildlife numbers always fluctuate based on a variety of factors found in nature (eg. habitat conditions) as well as man caused factors (eg. motorized use). One of the current problems facing elk and elk hunters in the Fall Creek watershed is the apparent displaced distribution of the elk during the summer and fall seasons to areas outside the watershed.

The population objective for the Tex Creek Zone is to winter approximately 2,500 cows and 525 bulls, of which 300 should be adult bulls. Recent aerial surveys (1999/2000) indicate that cows are at objective and bulls over objective. However, due to the fact that a number of elk from Unit 66A winter in this zone and that objectives differ between the Tex Creek and Diamond Creek zones, it is unknown what extra harvest opportunity may be available. Management is coordinated with Unit 66A of the Diamond Creek Zone where a major portion of the wintering Tex Creek elk are in summer and fall (Naderman 2001).

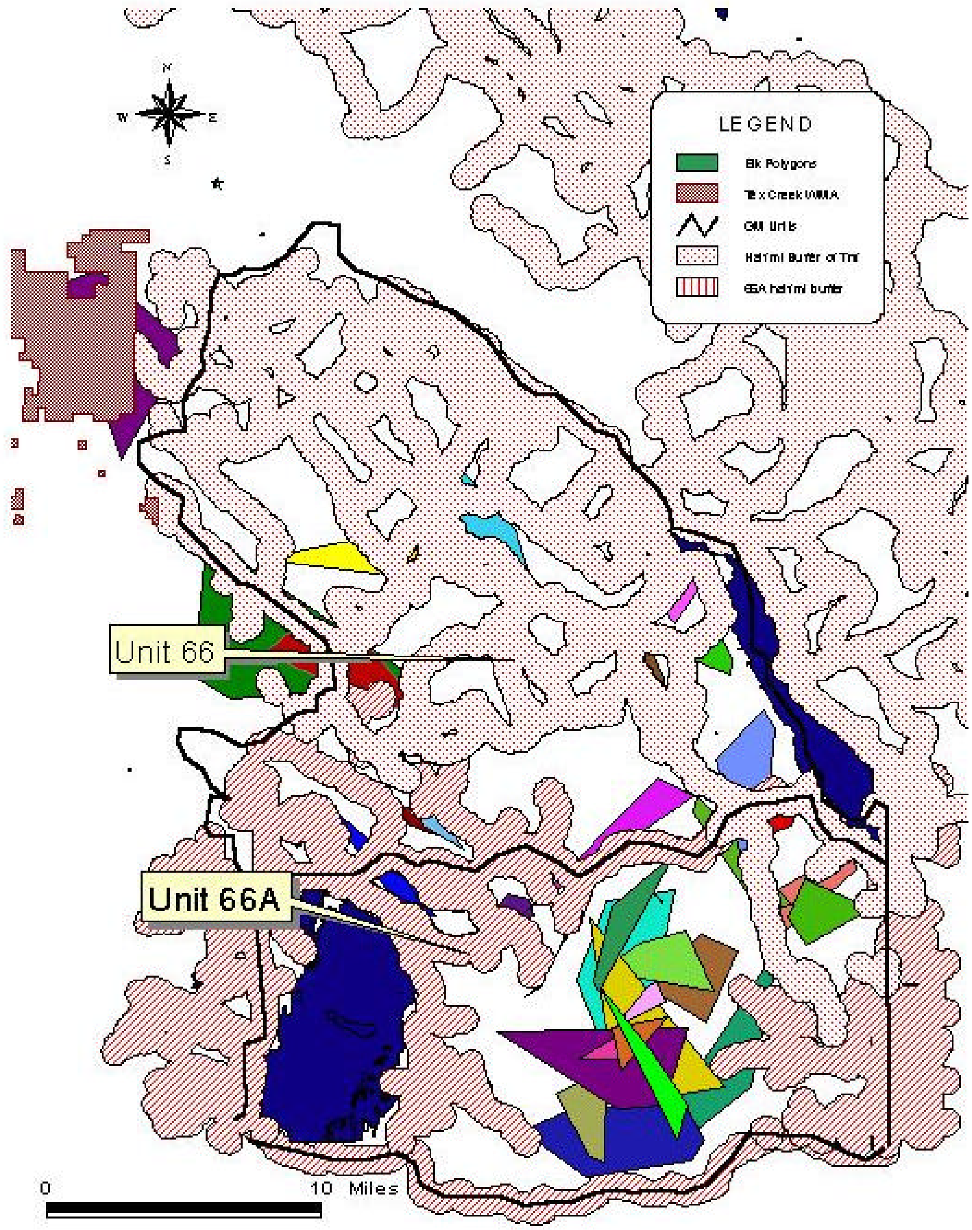

Figure 85: This shows results of a two year study in and adjacent to the Fall, Garden and Pritchard watersheds of 34 radio collared elk (each polygon is one elk) which were trapped in at Tex Creek winter range and were followed year long. The red shaded area is within one half mile of any motorized road or trail per Forest Service travel maps. It shows that most of the radio marked went to the Unit 66A roadless area (Thomas 2001).

Controlling the elk population has driven harvest strategies. Historical overharvest of bulls and underharvest of cows has been addressed with implementation of the dual tag zone system and increased antlerless permits on late hunts (Naderman 2001, IDFG 2001).

Mule deer and elk appear separated on the winter range and there are no known conflicts between elk and moose. Wintering elk and deer are not artificially fed except on an emergency basis. This has occurred recently in the winters of l988-1989 and l992-1993 near Tex Creek, and the IDFG does not want to feed because of the closeness to known brucellosis infected herds in Wyoming and Idaho (Naderman 2001, IDFG 2001).

In l978, 1979, and 1980 the IDFG conducted radio telemetry studies (Brown 1982) of elk wintering on Tex Creek WMA, the results of which indicated that these elk spent the summer primarily in Units 66 and 66A with some going to Units 69 and 76. This work was duplicated in l998-2000 with results showing the same trends in distribution and movement. Of concern, however, is the low proportion of marked animals remaining in the Tex Creek zone (including Fall Creek watershed) during the summer and fall (Naderman 2001, IDFG 2001, Thomas 2001).

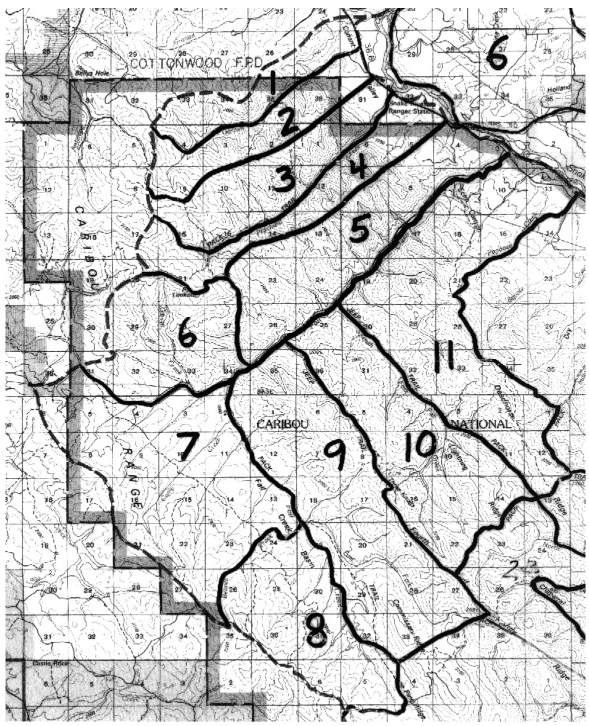

Figure 86: Map Subunits used in the Fall, Pritchard and Garden Creek Watershed big game winter range to count mule deer and elk by the Idaho Dept. of Fish and Game.

Table 28: Idaho Fish and Game Elk Count data for winter of 1999 –2000 showing classification and numbers of animals and other habitat features in different Sub units of Game Management Unit 66. Most all of the Fall, Pritchard and Garden Creek watersheds are big game winter range. Refer to Subunit map in figure 22.

Sub-unit	Stratum	Total	Cow	Calve	Spike	Rag horn	Ad Bull	Un-Class	Activity	% Snow	% Veg	Veg Class
6601	1	0	0	0	0	0	0	0	0	0	0	0
6602	1	0	0	0	0	0	0	0	0	0	0	0
6603	1	3	0	0	0	0	3	0	2	80	5	4
6604	1	3	0	0	0	0	3	0	2	80	5	4
6605	1	30	13	8	6	3	0	0	3	10	10	2
6605	1	22	16	3	2	1	0	0	3	0	0	2
6606	1	2	0	0	0	1	1	0	3	0	5	2
6607	1	37	24	6	5	2	0	0	3	90	5	2
6607	1	62	30	21	7	4	0	0	3	100	0	2
6609	1	8	0	0	0	7	1	0	3	50	5	2
6609	1	26	0	0	0	21	5	0	3	100	80	5
6609	1	4	0	0	0	4	0	0	3	50	50	5
6609	1	21	9	9	3	0	0	0	3	10	5	2
6609	1	96	46	29	12	8	1	0	3	10	5	2
6609	1	19	5	10	4	0	0	0	3	10	5	2
6609	1	204	128	46	17	13	0	0	3	10	5	2
6609	1	3	2	1	0	0	0	0	3	0	5	2
6610	1	0	0	0	0	0	0	0	0	0	0	0
6611	1	2	2	0	0	0	0	0	2	0	0	2
6611	1	3	0	0	0	3	0	0	2	0	0	2
6611	1	114	73	34	5	2	0	0	2	0	0	2
6611	1	8	6	2	0	0	0	0	2	0	10	3
6611	1	3	0	0	0	3	0	0	3	0	0	2
6611	1	21	12	5	2	2	0	0	3	0	5	2
6611	1	109	60	36	7	7	0	0	1	0	5	2
6611	1	1	0	0	0	1	0	0	3	80	5	2
6611	1	54	29	19	6	0	0	0	2	80	5	2
6611	1	8	8	0	0	0	0	0	2	0	0	2

Using a point count method (375 points) of ortho-photo quad maps and aerial photographs 33 percent elk hiding cover was estimated for the overall 60,033 acres watershed analysis area. Much of the best hiding cover is in the Pritchard, Garden and southeast Fall drainages. These more covered areas were estimated at about 43 percent hiding cover. Areas of the more open upper Fall Creek basin were 15 – 20 percent.

Figure 87: Photo of Upper Fall Creek basin elk and deer migratory range in Game Hunt Unit 66. Due to increasing off-road cross country routes elk appear to be staying here less during the summer and fall months preferring to travel to Unit 66A instead for more peace and quiet. In early spring, one can see many migrating herds of elk moving southward into the more roadless mountains from the Tex Creek winter range.

Threatened, Endangered And Sensitive Species (TES)

These watersheds still have many of the same species here originally before white settlement. Refer to the Wildlife Characterization write up for a list of Forest Service Sensitive species. Federally listed threatened or endangered species that occur here or may occur here include bald eagle, Canada lynx, gray wolf, grizzly bear and whooping crane. Whooping cranes are very rare at this time, even at Gray's Lake, which is about 10 miles or more south. Occasional unconfirmed reports of grizzly bear and gray wolf have been received in or near these watersheds. At the current time all of these species except the bald eagle would be seldom or rarely present. Bald eagles nest along the South Fork of the Snake River between Garden Creek and Fall Creek. It is likely the Conant Valley nest site was established near the mouth of Pritchard Creek in the early days. It is common for eagles to nest at the confluence of streams.

In recent years since the transplant of gray wolves in Idaho and Wyoming (to the north) a confirmed wolf was found and shot in the country south of here near Soda Springs, but it may have come from a game farm (Ligertown in Lava Hot Sprs). A recent wolf sighting (May 2001) just miles south of Fall Creek sounds like a reliable sighting. There are three good possibilities for it. It could be an old Ligertown animal or its off spring, a YNP wolf out of Jackson Hole or just a single lobo that many believe have been in the area all along?

As with all wildlife, riparian areas such as willows and cottonwood are very important to TES species. Any impacts to riparian areas in the watersheds have limited available habitat somewhat for TES species. Cottonwood habitat from Garden to Fall Creek has had a good amount of modification in places. Some of the private and BLM (Bureau of Land Mgmt) lands below Pritchard Creek have been converted to pasture. Much of the BLM is still in cottonwood type. At the mouth of Pritchard Creek the main boat access for the upper river is the BLM/ FS Conant Boat Landing which has a visitor's center and paved parking lot. The private South Fork Lodge upstream of this has buildings, lawns, hotel and stores. Some cottonwood and conifer habitat for eagles and other species is found on the FS Snake River Guard Station administrative site below the Swan Valley bridge. The administrative site has horse pastures, corrals, buildings and a dwelling in the cottonwood/ willow zone. State Highway 26 crosses Garden and Pritchard Creeks. The Spring Creek boat ramp is at the bridge where the river road (FS 076) parallels closely to the river to Fall Creek Falls.

The Conant bald eagle territory covers this stretch of river and peregrine falcons nest in this area also (Rice 2001). Overall, the South Fork of the Snake River cottonwood corridor has been identified as the single most important wildlife habitat in Idaho (USFWS 1980). Part of the reason for this is the healthy population of nesting bald eagles all up and down the river. Many studies have been completed on both eagles and cottonwoods here (refer to Whitfield et al publications 1988 - 2001, Merigliano 1998). The Conant breeding territory was one of the first to be re-established in SE Idaho during eagle recovery from the DDT era. They have been quite productive having fledged at least 27 young from 1972 – 1991 (Whitfield 1991). More current data is available from the Medicine Lodge Area, Bureau of Land Management in Idaho Falls.

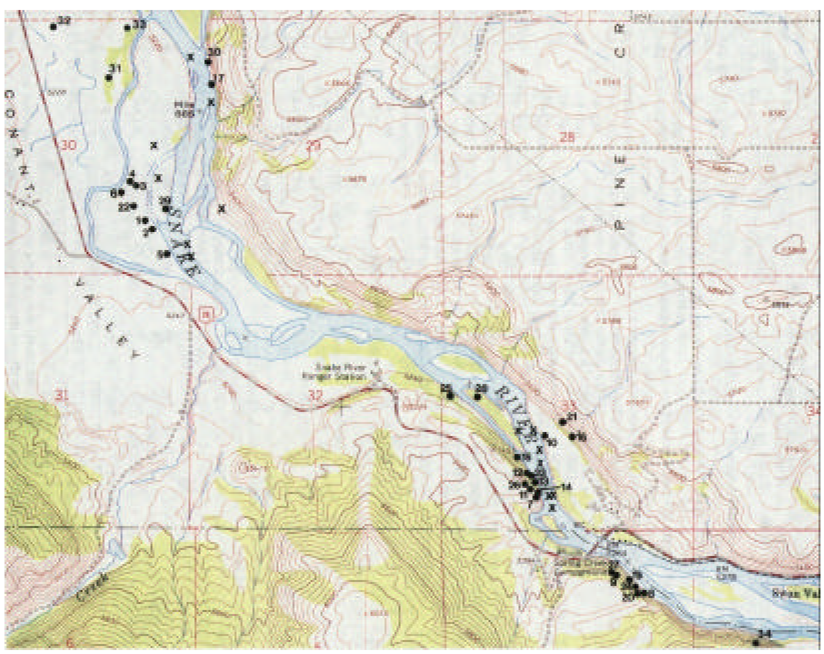

Figure 88: Map of Conant Nest Territory perches and forage sites (X) used by adults along the river up and downstream of the Pritchard Creek mouth in 1992 (Whitfield 1993).

Currently the BLM/ Forest Service Activities/ Operations Plan for the South Fork (USDI and USDA 1991) manages the use along the river. The Revised Targhee Forest Plan (RTFP) calls for monitoring of many TES species including bald eagles, peregrine falcons, goshawks, great gray owls, flammulated owls, etc. One furbearer transect is located in the upper Fall Creek basin. Refer to the Forest Monitoring Report (USDA, 2001) for more details.

Current conditions of aging forests both in the conifer and aspen types has probably improved nesting and foraging conditions for some sensitive species like the Flammulated owl. They appear to be more common now than previously thought. The natural conversion of aspen to conifer is resulting in dying and decadent aspen clones with increasing conifer preferred by some species. Excellent habitat occurs for Northern Goshawk and Great Gray Owls and probably a few Boreal owls. Three toed woodpeckers would occur in recently burned forests. Down dead woody material is also at the higher level providing potential habitat for lynx or fisher if they occur here. Both are species rare.

Figure 89: Woodpecker sign is all over the burned forested acres in Garden Creek (1999 fire). Recently burned forests are a favorite of the FS sensitive Three toed Woodpecker.

Figure 90: Large old snags with woodpecker cavities are common in north slope Douglas fir which is providing good to excellent habitat to sensitive species like the Flammulated owl and Townsend's Big-eared bat. Brooms in old Douglas fir and old Goshawk nests provide good nesting platforms for Great Gray Owls.

Columbian Sharp-tail Grouse and Sage Grouse both occur in the upper Fall Creek basin. More information is needed on both species. It is not known if a Sage Grouse Lek occurs here. Currently, the motorized road and trail densities and winter snowmobiles are greater than they have ever been before. This is an impact to TES species in that not only habitat is directly impacted by damage to vegetation, increased siltation into the streams resulting in impacts to prey (eg. trout for eagles), but also disturbance to them during the birthing season and displacement (eg. lynx and wolverine). Increasing road densities also result in greater removal of standing and down wood used by TES species.

In the recent past lynx have been reported near Skyline Ridge in 1990 (Lewis and Wenger 1998) and tracks of lynx (unconfirmed) at Fall Creek falls by Trevor Hill in 1995 (Lewis and Wenger 1998). Grizzly and wolf observations and sign have also been reported in the past few decades in or near the watershed by bear baiters, Fish and Game biologist, ranchers and county agent (Alford 2001). In early 1990's Lynn Merrill, Conservation officer in Swan Valley reported definite grizzly bear tracks between Pritchard and Garden Creeks (Merrill 2001).

No problems with grizzly bears or wolves have been reported in recent years related to grazing or recreation uses in any of the watersheds.

Table 29: This is a summary of more recent reported observations of wolves that we know about. The Palisades Ranger District was historical habitat for the gray wolf. There is a chance that wolf have occurred in these areas from time to time now in the late 1900's, even before the transplant in Idaho and Wyoming to the north in the mid 1990's.

Date	Location	Sighting	No.	Rating	Near WS
Oct 81	T2N R45E Sec.11	Animal	4	Possible	
Oct 82	T2N R42E Sec. 9	Animal	2	Possible	X
Oct 82	T5N R42E Sec.32	Animal	1	Possible	
Dec 82	T1S R45E Sec.11	Tracks	1	Possible	
Nov 83	T1N R45E Sec.19	Tracks	1	Possible	
Jul 91	T2N R41E Sec. 3	Animal	1	?	X
Sum 91	T2N R41E Sec ? Birch/Meadow C.	Animal SCS Personnel	?	?	X
Sum 91	T2N R41E Sec.? Birch Creek	Animal Pvt. Landowner (W. Jensen)	?	?	X
Late 80's Or early 90's	T2N R41E Sec.? Meadow/Deep Creek	Tracks S. Haynes-IDFG	?	?	X
Sep 92	T2N R45E Sec 5	Howling	1	Probable	
Oct 93	T1N R45E Sec.32	Animal	1	?	
May 14, '96	T3N R44E Sec.24 Pine C Pass	Animal Black Believed to be YNP animal	1	Probable	
May 20, '96	T3N R44E Sec.24 Pine C Pass, ¼ East	Animal Black also Per M.Bogle-FS	1	Probable	
May 96	¼ mi. past SFSR Trailhead on bench Above river	Track Black also Per M.Bogle FS	1	?	X
May 24, 2001	Between Brockman And Caribou G.Stations T3S, R43E, Sec 12	Doug Heyrend Rob Harris	1	?	X

Note: Some information was reported by Steve Haynes (1993) the manager of the Tex Creek IDFG big game winter range which borders the Forest. A migration of elk and deer occurs each spring and fall to and from the area. We had made a request for the U.S. Fish and Wildlife wolf search team to look at areas in the winter of 1993-94, but their tight schedule in other parts of the State prior to the central Idaho and Yellowstone transplants did not allow for it.

Table 30: A summary of more recent observations we know about in the vicinity of the Palisades Ranger District for Grizzly Bear.

Date	Location	Sighting	No.	Rating	Near WS
1980's ?	Upper Tex Crk Drainage	Animal Tracks	1	?	X
Jun 87	T1N R42E Sec. 4 Dirk Burgard, Guide	Animal-videotaped (unk where)	1	?	X
Jun 88	T1N R42E Sec. 4 Dirk Burgard, Guide	Animal-videotaped (Unk where)	1	?	X
Oct 89	T2N R44E Sec. 12	Animal-photos	4	Confirmed	
Nov 90	T2S R44E Sec. 23	Animal-aggressive	1	?	
Fall 87	T1N R42E Sec. 8 D.Burgard, guide	Tracks	1	?	X
Early 90's	T1N, R43E, Sec 5 Lynn Merrill, IDFG Duane Scott, Rancher	Tracks	1	?	X

Note: A set of observations of interest are those in the upper Garden Creek. The observations were made by a local guide who had videotaped the bear at his bait station in about 1988. He had kept a detailed field notebook and his observations were as follows: in 1987, on June 24 from 4:30 – 7:15 pm, June 25 from 6:00 – 8:00 pm and on June 29 from 7:45 – 11:00 pm; and in 1988 on June 19, 20, 21, 29 and 30. He said that he thought he sent the tape to the U.S. Fish and Wildlife Service in Boise to someone in that office, but could not remember the name. We have not found the video at either the IDFG or USFWS. Dirk also followed tracks in '87. FS has photos of Oct 89 sightings and they were confirmed to be GBs by GB team member Dick Knight. Of the early 1990's tracks between Fall and Pritchard L. Merrill said they were definitely GB tracks.

Motorized Influences On Wildlife

Currently, the increasing proliferation of cross country trails in addition to the legal roads and motorized trails has probably created the greatest influence on wildlife and habitat than any other use in the watershed. It is directly tied to the big game hunting during the fall season where many hunters create new travel routes in search of game or to retrieve game using the newer all terrain vehicles (ATVs) which have tripled in use in the past 6 years (Interagency ATV Group 2001). Summer time ATV and motorcycle users also contribute to the increase of new cross country routes and steep hillside climbs for recreational purposes. Motorized travel in the watershed is regulated by the Forest Travel Map which is available to the public (USDA 2000). The main purpose for the regulation is to protect wildlife and habitat. Refer to discussion in the big game section as well as others.

Other motorized use damage to wildlife habitat is caused by larger regular sized vehicles, particularly along the Fall Creek riparian zone. Often routes develop next to streams in riparian zones or the streambed itself becomes an illegal motorized trail. Some dispersed campers like to drive their motor vehicles or motor homes to within a few feet of stream banks. These uses are causing damage to riparian habitat. Often when a road like the Fall Creek road (077) is built in the riparian zone there are constant conflicts with beaver because it was not relocated out of their habitat when roads are upgraded or heavy maintenance occurs.

Figure 91: This trail in the Fall Creek upper drainage was an original horse trail that became a popular motorcycle trail in the 1980's and before. Currently, it is being made into an ATV trail by continued use. This is allowed under the new Targhee Forest Travel Plan (2000) which allows ATV use on all designated numbered trails whether they are wide enough or not, but this trail is not recommended for ATV use.

Figure 92: Roads like this one began as jeep trails created by hunters and ranchers that were often located next to streams and on inappropriate terrain. This old jeep trail is now a FS system road that is causing inroads to elk habitat and providing access to many illegal roads and ATV routes that branch off from the legal ones.

Figure 93: An eroding stream bank in the Fall Creek riparian willow habitat that is negatively influenced by motorized dispersed camping. The Travel plan allows camping and woodcutting within 300 feet of any legal road or trail as long as vegetation is not damaged.

Figure 94: This is a dry side channel of upper Fall Creek in late summer which has become an illegal motorized trail. ATVs and motorcycles are driving over the existing beaver dam scattering materials in the channel to travel this route.

Figure 95: Much of the Fall Creek road (077) displaces beaver and other wildlife habitat and conflicts will continue to occur until a road like this is relocated up and out of the riparian zone. The FS has given the right of way ownership of this road to Bonneville County and they now control the use and maintenance of it. Cooperation with the county will be needed for future wildlife protection or management here.

Refer to the Big Game, Current Condition section above for more details on effects to elk habitat. Figure 21 shows results of a radio tracking study by Idaho Department of Fish and Game (Thomas 2001) where high levels of motorized route (only legal routes considered in the study) appears to be causing elk herds (based on this radio marked sample) to travel through the Unit 66 summer habitat to a more suitable roadless area in hunt unit 66A. This may be causing problems for managing the elk herd there. The Thomas (2001) study as well as the work done by Brown (1982), appears to be a field validation for the large and ever increasing volume of research documenting the impacts of motorized access on elk habitat selection and vulnerability (Markum and Edge 1991, Perry and Overly 1976, Hershey and Leege 1976).

Distribution of motorized routes in parts of the watershed are not good for maintaining elk during the summer – fall seasons. Illegal as well as legal roads and trails are found on many ridgetops and along many stream bottoms in the watershed. This scenario is one some researchers have found damaging to elk habitat (Rowland et al. 2000; Edge and Marcum, 1991). The motorized use in the watershed is also not managed intensely. Funding for proper law enforcement and barrier engineering has not been forthcoming. Cole et al (1997) found that elk movements decreased when vehicular access was tightly regulated and suggested that overall herd fitness would improve with reduced disturbance. Funding for improving roads have been more readily available and some have been turned over to local county management (eg FS 076 and 077) who have other funds to do the maintenance and upgrading.

Figure 96: An example of an old jeep road not present in 1952 aerial photos that is present today.

Providing increased motorized access in the watershed has most likely increased elk harvest rates there, but hunter success would be lower. This is due to higher hunter densities created by high motorized access. Gratson and Whitman (2000) found that bull elk hunter density in roaded habitat was 4 times greater than in managed access areas. They also found that hunter success rate was lower in roaded areas versus the managed access areas and elk density was higher in the managed access areas.

Figure 97: A new and well established illegal cross country ATV route in Fall Creek. For every legal road and trail there is a multiple factor of illegal trails in the motorized system. This one currently has a fence barrier and sign. Many users do not know it is illegal and others who do remove signs and barriers so the habitat damage continues. This route also has illegal snowmobile use in big game range in the winter.

Figure 98: Illegal cross-country route going across Fall Creek riparian habitat located just downstream of the confluence of South Fork Fall and Fall Creeks.

Elk Habitat Effectiveness (EHE) - The analysis area for this vegetation project includes Prescription Area "2.7(a) Elk and Deer Winter Range". Refer to the Revised Forest Plan Prescription map (USDA, Forest Service 1997, Map #10, 3-M). However, it is in reality year round range for elk and mule deer. At least 158.4 miles of both legal and illegal motorized routes are in the 60,033 acre watershed area. There are more illegal routes that have yet to be documented. This results in at least 1.7 miles of motor route per square mile. The elk hiding cover in the whole area is estimated to be 33 percent, and in the more forested north and east 43 percent cover. Refer to the Big Game section. Based on these estimates the overall EHE (both hiding cover and roads) is believe to be about 56 percent. However, in the more open areas of the watershed the EHE could be in the 42 percent range. Assuming there were no motorized routes in the area, the highest the EHE could be is 91-98 percent depending on the amount of cover available (Alford et al. 2001).

A better estimate of EHE is needed using subunits of about 5000 acres or more which would mimic the average size of an elk's home range. This would provide a better estimate of where elk habitat is best. The ideal locations for elk would be where motorized route is at a minimum and cover is at 50 percent, and there are some pockets in the watersheds where this condition exists.

A broad brush approach to calculating EHE was done for the Revised Targhee Forest Plan using the HIDE2 model and estimates of tree densities. The method has been found to under estimate hiding cover in other locations on the Palisades Ranger District so it was not used here. For information the hiding cover for these watersheds (WS 38, 39 and 40) under this method was 12.42 percent, 12.75 percent and 12.66 percent respectively. The resulting EHE's were about 49-50 percent. This analysis also did not use all of the motorized routes either (USDA 1997; Process paper D).

Elk Vulnerability (EV) - This area falls within Idaho Game Management Unit 66 and the Idaho Department of Fish and Game goal for this area is to have no more than 60 percent bull mortality (USDA 1997). Elk vulnerability (EV) is measured by percent bull mortality during the hunt and is an indicator of population health. For GMU 66 the EV is calculated at 76, 70 and 83 percent for the watershed area (WSs 38, 39 and 40 respectively) for the existing condition as calculated in the 1997 RTFP. The vulnerability exceeds the threshold goal by 16 to 23 percent due to high motorized access density in the hunt unit and due to the second highest hunter-day densities on the Targhee Forest (19-20 hunter days per sq. mile). Only hunt unit 60 is higher.

Motorized access also brings other uses and influences on wildlife habitat. Whereever roads go, increasing impacts of all kinds can be expected on wildlife and habitat. Road trails are used by livestock and ranchers managing livestock. The RTFP allows use of cross country travel routes by ranchers. Woodcutting occurs more often. Trappers have better access to trap beaver and other furbearers. Powerline access is made by the Bonneville Power to maintain and repair the major line going through Fall Creek. The power line roads are not counted in the road densities above or in the Forest Travel plan, but are used by recreational vehicles. During the critical spring season for big game "antler hunting" off of ATVs is a popular activity. For every new trail or road that is created there will be new ones soon or recreational hill climbs. All of these activities are affecting habitat or wildlife in some way in the watersheds. During the winter illegal hill climbing and pioneering of new routes is very disturbing to elk and deer. Even the legal designated routes such as the Fall Creek road is displacing a certain amount of wildlife or decreasing the value of big game winter range in that corridor. To have a designated motor route through critcal winter range is a compromise for both recreationists and the game, but more so for the game if mortality results.

South Fork Of Snake River And Private Lands

The South Fork of the Snake River forms the edge of these watersheds from Garden Creek upstream to Fall Creek falls. As mentioned, the South Fork has been listed as the number one habitat in the State of Idaho by the US Fish and Wildlife Service (1980). Refer to discussion above for threatened and endangered species. This section of river is in the Conant Valley bald eagle territory and has important cottonwood habitat bordered by private farms and ranches and other developments. The private Conant valley ranch of 1600 acres is in the watershed at the mouth of Garden and Pritchard Creeks. They graze between 215 to 280 head of cattle and raise hay. Prior to 1984 they diverted water from the Pritchard Creek dam on the Forest. They now use wells. The water table is near the surface on the ranch and they stock a fish pond filled with subsurface water. Elk, deer and many other species of edge habitat loving wildlife benefit from the ranch bordering the Forest. This has resulted in no public access up the bottom of both Pritchard and Garden Creeks which has been a major reason game herds are healthier here than more roaded sections of the watershed. Hunters seek after game from motorized routes from both the Fall Creek and Antelope Creek sides.

The Bagley Ranch is located near the mouth of Fall Creek and this private pasture along Fall Creek has benefits similar to the Conant pastures for wildlife, except for it is right next to the Fall Creek road 077 which is managed by Bonneville County. The county decides if Fall Creek road is opened or closed (for emergency game feeding for example) and not the FS even though the road is on the Caribou National Forest. The FS has given the road easement to the county. There is also private farmland between Pritchard and Fall Creeks. This also provides good edge habitat diversity for wildlife. Refer to figures 48 – 51.

The Quarter Circle O Ranch has a property of about 640 acres in the upper Fall Creek basin. The owners would like to trade the Forest Service land elsewhere so this piece can avoid development in the future. So far this potential land trade has not been able to be completed. It is in prime wildlife habitat for big game and other species, some rare. It would be a great addition to the National Forest habitats around it. It is in an area of sagebrush, bitterbrush and aspen. The FS also would not like to see this parcel developed.

Grazing, Mining, Logging, Woodcutting and Special Use Influences

There are currently influences from grazing which is probably ranks second next to motorized and hunting recreation activity for effects on wildlife and habitat, particularly riparian habitat. Refer to riparian and motorized sections. Mining influence on wildlife in these watersheds has been minor as has been logging. There have been a few phosphate exploration digs in Garden, Pritchard and Fall Creeks. A one-fourth mile deep tunnel in Pritchard Creek was closed a few years ago and a bat grate was installed after a survey determined bats were present. A large open rock pit is located in Echo Canyon and has taken about 60 acres of habitat from winter range.

Figure 99: Idaho Travertine rock mine. It displaces about 60 acres of game winter range, but provides stone for fine construction rock facing on buildings.

Woodcutting has had a few localize impacts due to jeep road expansion and removal of dead wood resource. These effects were discussed in the TES and motorized sections above.

A major special use in the area is a BPA powerline that parallels Fall Creek and has resulted in access roads to the power poles. More are being built currently. Refer to the motorized section for more discussion. These roads are not counted in the Forest Travel Maps or road density nor are there any gates controlling access at this time.

Figure 100: New powerline road built off the Rash Canyon Road to access power poles on the BPA line in Fall Creek. BPA will also be building a culvert across Fall Creek soon to service this road that will provide easier access up Rash Canyon that leads to a large network of legal and illegal motorized trails in the watershed. Currently, the ford crossing on Fall Creek inhibits both summer and winter vehicles. The Rash road is not a designated route in winter range.

Figure 101: An example of the powerline access roads along the Fall Creek stream corridor. These roads do not count in the Forest Travel plan road density, because they are administratively closed, but they do not have any barriers to keep traffic out.

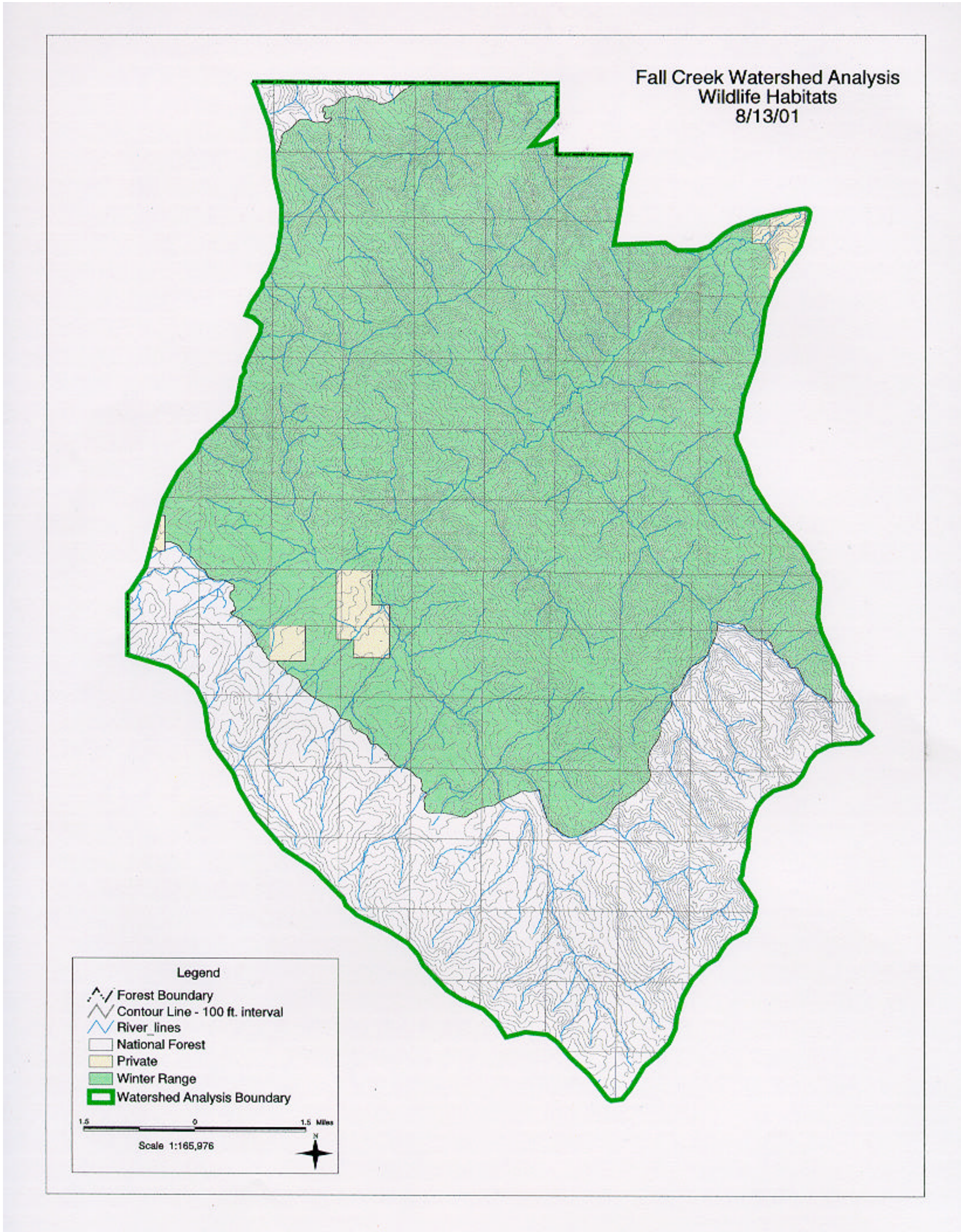

Figure 102: Fall Creek Watershed Analysis Wildlife Habitat

RECREATION

Dispersed Camping

Summer Dispersed camping is fairly limited during most of the year to areas accessible by vehicle. This is primarily along the lower part of the Fall Creek road. Some summertime camping may occur at other locations but it is very infrequent. This part of Fall Creek is identified in the dispersed camping prescription. There are approximately 12 to 20 sites along Fall Creek and next to the road that are used substantially during the summer months for dispersed camping. ATV and motorcycle seems closely associated with dispersed camping in this area. During the winter and spring months no dispersed camping has been noted. During the fall or hunting season dispersed camping increases both in numbers and location. Along the fall creek road the normal camping location are occupied for the most part, but backcountry camps (tent) increase significantly from September through October. All the campsites have not been inventoried so there are some camps that have not been seen by the district. Fall time see more use of horses in the camps and because of the wet weather, more damage is done at the campsites.

Dispersed camping is popular around water. Camps occur along streams (like Fall Creek) and other tributaries in the watershed. RV camping seems to be popular along the Fall Creek Road. Some RV camping occurs along the Skyline Ridge road but mostly it is during the fall hunting season. Group camping has increased and is popular along Fall Creek. There are 4 or 5 locations, which have enough room for group RV parking and these locations seem to fill first and most often.

Figure 103: Dispersed camping site adjacent to Fall Creek.

Figure 104: Group dispersed camping site near Echo Canyon along Fall Creek Road

Motorized Travel

All cross-country travel by motorized vehicles is restricted to designate routes. Most of the system trails are open for motorized travel by vehicles 50" or less. Snowmachine travel is open for cross-country travel except the designated winter range in Fall Creek. The Fall Creek Road has been designated for a winter designated travel route through the winter range. All terrain vehicles are popular in this area. Use has increased significantly since about 1996. Most trails in the watershed were not built of ATV but as time goes on ATV use is going on them anyway. Motorcycle use has been and still is popular for the trails in the watershed, but has not been increasing as fast as ATV use. Illegal use is high in the area and difficult to control because of the easier accessible terrain. Motorized users are different for the different time of the year. Although some may be the same people. Summer use has increased the most in the last few years. People who do not hunt come to the area to ride the trails either on a motorbike of ATV. These are often linked with the dispersed camping. Hill climbs are most a result of illegal summer user. Hunting or fall season is more of the new type hunter who cannot afford or handle a horse. It offers a new freedom to hunting. These are the people who created new illegal trails along ridges or though timber stands. The new ATV is much better and able to do more. Hence new trails are appearing in places where trails have not been in the past. This is largely a result of hunters. Spring use is also increase but a slower rate. People follow the snow up the hill as it melts to gather big game antlers. This is relatively new but is catching on fast. Most of this is cross-country travel and is illegal. Snowmachine travel is high in surrounding areas but is only moderate in the analysis area. This is primarily due to the lack of snow. Wintering animals use the area because of the lack of snow, but snowmachine done use the area for the same reason. Much of the analysis area is in the winter range and as such is not the best snow conditions for snowmachines. Some illegal use does occur, but it is limited in scope. It appears more because one machine can make a lot of tracks, which show up on the new snow. The Fall Creek road is a designated route for snowmachine travel as is the Blacktail Road.

Figure 105: Illegal hill climb along Fall Creek Road. This one was made by 4x4 truck, many are single track motorbike trails.

Developed Facilities

There are no developed camping facilities in the analysis area. Falls waterfall is planned to be developed in the future by building a staircase and viewing area. No time lines have been set for this project and it is likely to be a number of years before it is done. No other plans for development are know in the analysis area at this time.

Outfitting

Commercial outfitting in the analysis area is relatively small at this time. Hunting outfitting occurs in the upper part of the much of the Fall Creek Drainage, but does not occur in the Pritchard or Garden Creek Drainages. Between 100 and 150 actual use service days for commercial hunting outfitting has been reported annually for the analysis area. Summer trial rides for commercial outfitting have been authorized in most of the analysis area. Approximately 837 service days have been permitted in the analysis area to date, but only approximately 350 service days are actually being used. The total use days has not significantly changed in the last three years. Currently there is no outstanding request for any new outfitting or additional service days.

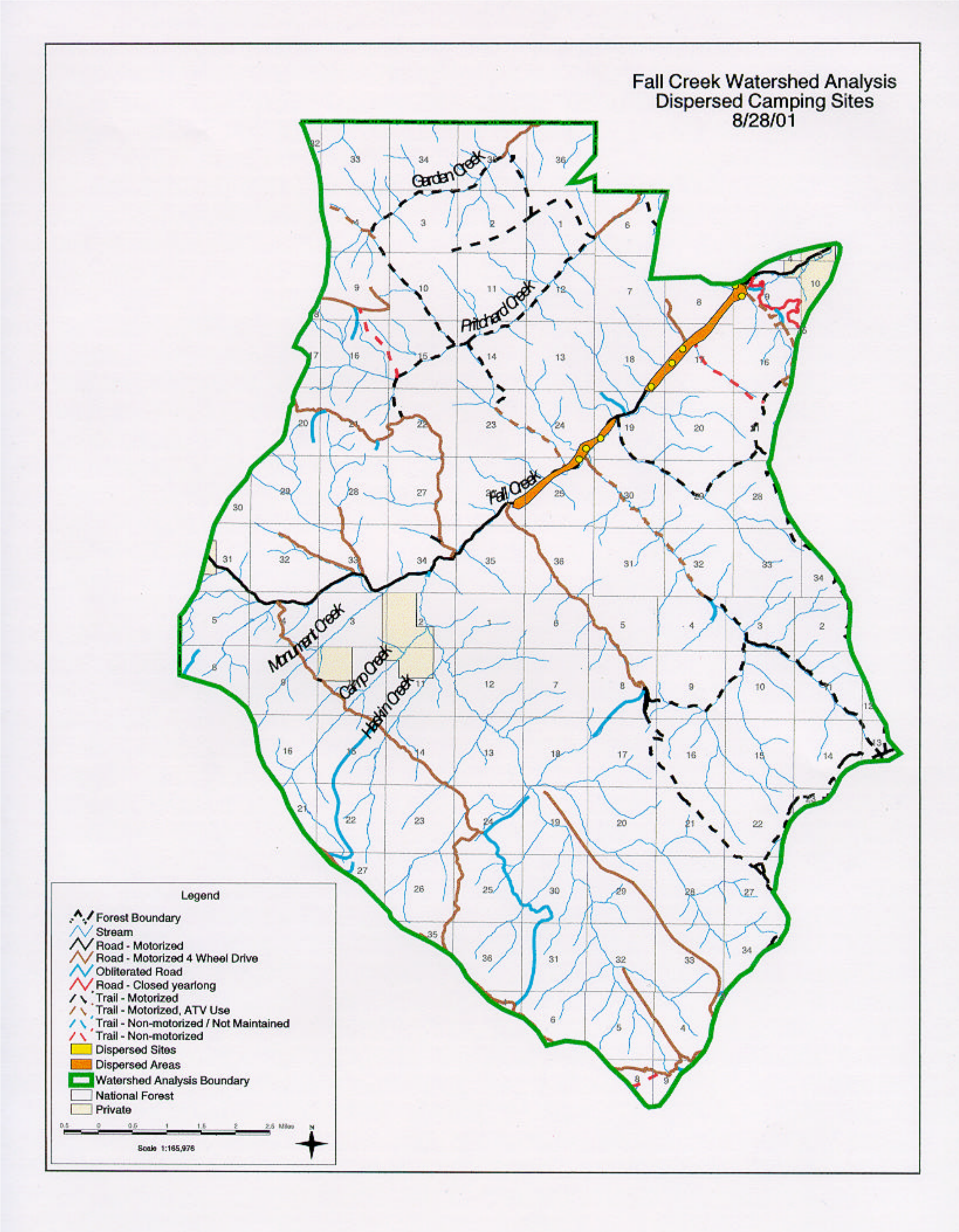

Figure 106: Fall Creek Watershed Analysis Dispersed Camping Sites (based on existing information).

TRANSPORTATION

The Fall Creek Road is classified as a Collector road. The definition is: A collector serves smaller land areas than arterials. Connects arterials to local roads or terminal facilities. In 1985 the Fall Creek Road was put on our Schedule A, the Forest Development Road Agreement with Bonneville County, Idaho. An easement was given to Bonneville County for 14.0 miles of the Fall Creek Road #077 and 66 feet in width, or 33 feet each side of centerline of the road. From 1985 to the present time this road has been maintained by Bonneville County.

The Snake River Road is classified as an Arterial road. The definition is: An Arterial provides service to large land areas. Connects with other arterials or public highways. Also in 1985 the Snake River Road was put on our Schedule A, the Forest Development Road Agreement with Bonneville County, Idaho. An easement was given to Bonneville County for 23.3 miles of the Snake River Road #076 and 66 feet in width, or 33 feet each side of centerline of the road. From 1985 to the present time this road has been maintained by Bonneville County.

The other roads in the watershed on forest are as follows: Bagley #060, Phosphate Canyon #003, Blacktail # 066, Gibson Creek #056, Bates Canyon #182, Bally's Hole #057, Travertine Mine Spur #386, South Fork Fall Creek #85, Rash Canyon #170, June Creek #376, Lone Pine Ridge #211 and 4th of July Commissary #017, are all Local Roads. Which are defined as: Local, single purpose road. Connects terminal facilities with collectors or arterials. These roads are the responsibility of the Forest Service to be look after and maintained as seen fit. The roads in this category fall under a Maintenance Level 2, which means they are roads that are maintained for high-clearance vehicles.

The Forest Service under the recreation program or the Adopt-Trail-Program maintains all motorized trails in the watershed analysis.

Within the watershed analysis area there is 33.2 miles of high clearance vehicle roads and 13 miles of road, which is classified as improved roads, gravel or native dirt surface. Also in the analysis area 11.6 miles of road are planned to be decommissioned as outlined in the FEIS of "Open Road and Open Motorized Trail Analysis", (Motorized Road and Trail Travel Plan). With 2.1 miles of road that is closed to motorize use yearlong.

There are 35.8 miles of motorized trails in the analysis area mainly recommended for motorcycles and another 7.4 miles, which are designed for ATV use.

A determination was made in the FEIS of Open Road and Open Motorized Trail Analysis of which roads, in the analysis area were to remain open; which roads were to be closed; which roads were to remain closed; which of the roads were to be open; to look at opportunities for constructing new roads within the analysis area, and which roads were roads in the analysis area were to be decommissioned.

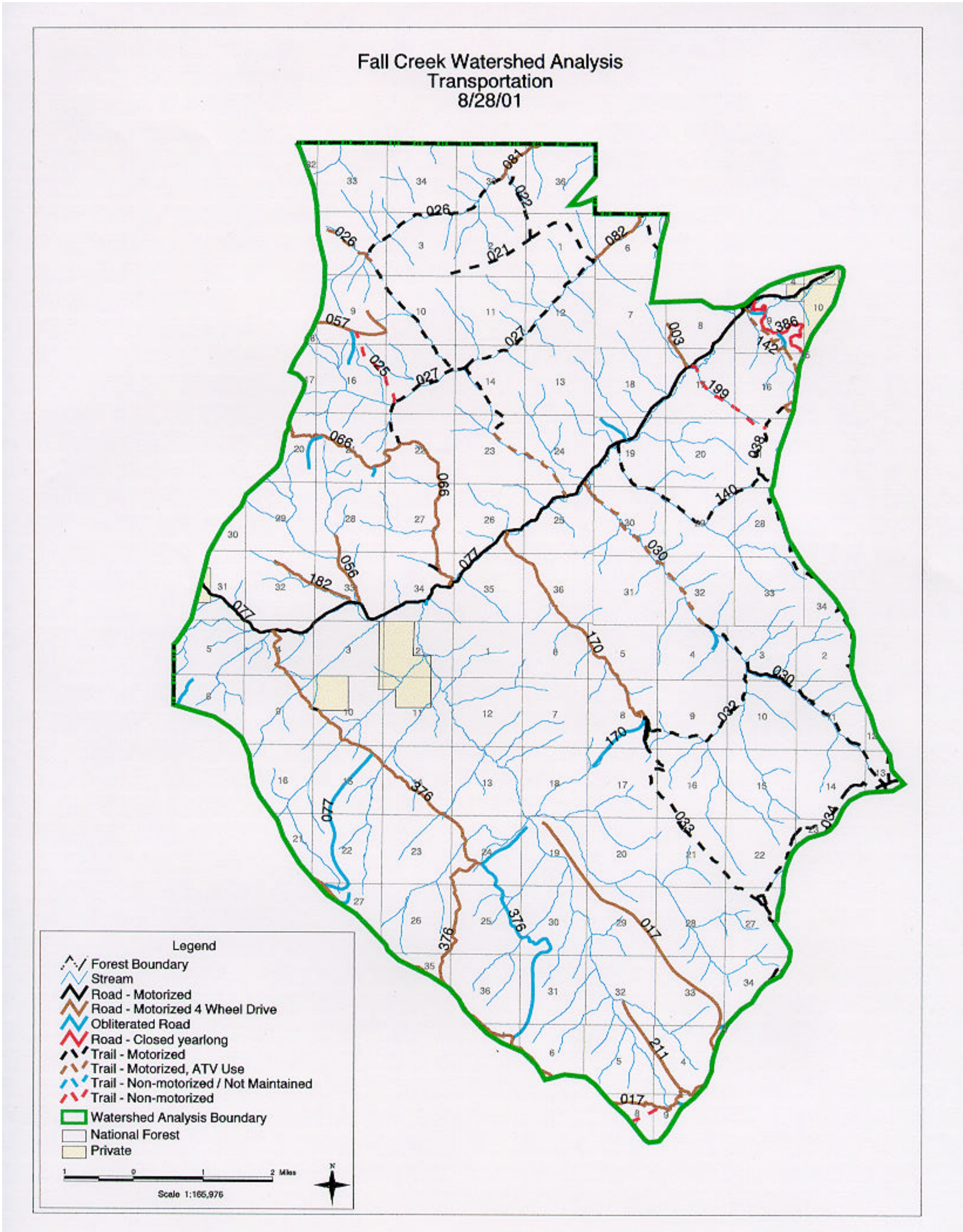

Figure 107: Fall Creek Watershed Analysis Transportation System.